

Cover Page

Order ID:	Q2845
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Project ID: Transfer Station-SPDES

Client: Tully Environmental, Inc

Lab Sample Number

Client Sample Number

Q2845-01 001 willets Pt Blvd(july)
Q2845-04 002 35th Ave (july)

I certify that the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Signature :		
Signature .	—————— Date	· 8/18/2025

NYDOH CERTIFICATION NO - 11376

NJDEP CERTIFICATION NO - 20012



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						





APPENDIX A

QA REVIEW GENERAL DOCUMENTATION

Project #: Q2845

	Completed
For thorough review, the report must have the following:	
GENERAL:	
Are all original paperwork present (chain of custody, record of communication, airbill, sample management lab chronicle, login page)	<u> </u>
Check chain-of-custody for proper relinquish/return of samples	<u></u>
Is the chain of custody signed and complete	<u></u>
Check internal chain-of-custody for proper relinquish/return of samples /sample extracts	<u> </u>
Collect information for each project id from server. Were all requirements followed	<u> </u>
COVER PAGE:	
Do numbers of samples correspond to the number of samples in the Chain of Custody on login page	✓
Do lab numbers and client Ids on cover page agree with the Chain of Custody	✓
CHAIN OF CUSTODY:	
Do requested analyses on Chain of Custody agree with form I results	✓
Do requested analyses on Chain of Custody agree with the log-in page	✓
Were the correct method log-in for analysis according to the Analytical Request and Chain of Castody	✓
Were the samples received within hold time	✓
Were any problems found with the samples at arrival recorded in the Sample Management Laboratory Chronicle	<u> </u>
ANALYTICAL:	
Was method requirement followed?	✓
Was client requirement followed?	<u> </u>
Does the case narrative summarize all QC failure?	<u> </u>
All runlogs and manual integration are reviewed for requirements	✓
All manual calculations and /or hand notations verified	<u> </u>

QA Review Signature: SOHIL JODHANI Date: 08/18/2025



LAB CHRONICLE

OrderID: Q2845

Client: Tully Environmental, Inc

Contact: Dean Devoe

OrderDate: 8/13/2025 11:47:00 AM

Project: Transfer Station-SPDES

Location: J11,VOA Lab

LabID	ClientID	Matrix	Test	Method	Sample Date	Prep Date	Anal Date	Received
Q2845-01	001 willets Pt Blvd(july)	Water			08/12/25			08/13/25
	Diva(july)		Metals Group 10	200.7		08/15/25	08/15/25	
Q2845-04	002 35th Ave (july)	Water			08/12/25			08/13/25
			Metals Group 10	200.7		08/15/25	08/15/25	



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Hit Summary Sheet SW-846

SDG No.: Q2845 **Order ID:** Q2845

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(july)							
Q2845-01	001 willets Pt Blvd(july)	Water	Copper	41.1		1.89	10.0	ug/L
Q2845-01	001 willets Pt Blvd(july)	Water	Iron	3590		18.0	50.0	ug/L
Q2845-01	001 willets Pt Blvd(july)	Water	Lead	1.76	J	1.21	6.00	ug/L
Client ID:	002 35th Ave (july)							
Q2845-04	002 35th Ave (july)	Water	Copper	74.0		1.89	10.0	ug/L
Q2845-04	002 35th Ave (july)	Water	Iron	5070		18.0	50.0	ug/L
Q2845-04	002 35th Ave (july)	Water	Lead	11.4		1.21	6.00	ug/L



SAMPLE DATA



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Report of Analysis

Client:	Tully Environmental, Inc	Date Collected:	08/12/25
Project:	Transfer Station-SPDES	Date Received:	08/13/25
Client Sample ID:	001 willets Pt Blvd(july)	SDG No.:	Q2845
Lab Sample ID:	Q2845-01	Matrix:	Water
Level (low/med):	low	% Solid:	0

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7440-50-8	Copper	41.1		1	1.89	10.0	ug/L	08/15/25 10:02	08/15/25 15:14	EPA 200.7	,
7439-89-6	Iron	3590	N*	1	18.0	50.0	ug/L	08/15/25 10:02	08/15/25 15:14	EPA 200.7	•
7439-92-1	Lead	1.76	J	1	1.21	6.00	ug/L	08/15/25 10:02	08/15/25 15:14	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: 08/12/25 Project: Transfer Station-SPDES Date Received: 08/13/25 Client Sample ID: 002 35th Ave (july) SDG No.: Q2845 Lab Sample ID: Q2845-04 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	74.0		1	1.89	10.0	ug/L	08/15/25 10:02	08/15/25 15:18	EPA 200.7	
7439-89-6	Iron	5070	N*	1	18.0	50.0	ug/L	08/15/25 10:02	08/15/25 15:18	EPA 200.7	
7439-92-1	Lead	11.4		1	1.21	6.00	ug/L	08/15/25 10:02	08/15/25 15:18	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

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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:	Fully Environmental, 1	Inc	<u>_</u>	SDG No.:	Q2845
Contract:	TULL01		_	Lab Code:	ACE
Initial Calib	oration Source:	EPA	_		
Continuing	Calibration Source:	Inorganic Ventures	_		

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)		M	Analysis Date	Analysis Time	Run Number
ICV01	Copper	1010	1000	102	95 - 105	P		08/15/2025	11:50	LB136851
	Iron	3940	4000	98	95 - 105	P		08/15/2025	11:50	LB136851
	Lead	3820	4000	96	95 - 105	P		08/15/2025	11:50	LB136851



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Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: T	ully Environmental, l	Inc	<u>_</u>	SDG No.:	Q2845
Contract:	TULL01		_	Lab Code:	ACE
Initial Calib	ration Source:	EPA	_		
Continuing (Calibration Source:	Inorganic Ventures			

		Result ug/L	True Value	%	Acceptance			Analysis	Analysis	Run
Sample ID	Analyte			Recovery	Window (%R)		M	Date	Time	Number
LLICV01	Copper	21.8	20.0	109	80 - 120	P		08/15/2025	11:56	LB136851
	Iron	103	100	103	80 - 120	P		08/15/2025	11:56	LB136851
	Lead	11.7	12.0	98	80 - 120	P		08/15/2025	11:56	LB136851



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Metals

- 2a - INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:	Tully Environmental, Inc	SDG No.:	Q2845
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)	M	Analysis Date	Analysis Time	Run Number
CCV01	Copper	1240	1250	99	90 - 110	P		08/15/2025	12:26	LB136851
	Iron	4980	5000	100	90 - 110	P		08/15/2025	12:26	LB136851
	Lead	4870	5000	97	90 - 110	P		08/15/2025	12:26	LB136851
CCV02	Copper	1210	1250	96	90 - 110	P		08/15/2025	13:40	LB136851
	Iron	4840	5000	97	90 - 110	P		08/15/2025	13:40	LB136851
	Lead	4680	5000	94	90 - 110	P		08/15/2025	13:40	LB136851
CCV03	Copper	1220	1250	97	90 - 110	P		08/15/2025	15:04	LB136851
	Iron	5030	5000	101	90 - 110	P		08/15/2025	15:04	LB136851
	Lead	4720	5000	94	90 - 110	P		08/15/2025	15:04	LB136851
CCV04	Copper	1240	1250	99	90 - 110	P		08/15/2025	15:55	LB136851
	Iron	5040	5000	101	90 - 110	P		08/15/2025	15:55	LB136851
	Lead	4800	5000	96	90 - 110	P		08/15/2025	15:55	LB136851
CCV05	Copper	1250	1250	100	90 - 110	P		08/15/2025	16:38	LB136851
	Iron	5050	5000	101	90 - 110	P		08/15/2025	16:38	LB136851
	Lead	4830	5000	97	90 - 110	P		08/15/2025	16:38	LB136851



Tully Environmental, Inc

22.0

103

12.6

TULL01

Client:

CRI01

Copper

Iron

Lead

Contract:

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

SDG No.:

Lab Code:

65 - 135

65 - 135

65 - 135

P

P

Q2845

ACE

08/15/2025

08/15/2025

08/15/2025

LB136851

LB136851

LB136851

12:04

12:04

12:04

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20.0

100

12.0

Metals

- 2b -CRDL STANDARD FOR AA & ICP

Initial Calibra Continuing Ca	ation 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

110

103

105



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Metals

- 3a - INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2845

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	20.0 100 12.0		08/15/2025 08/15/2025 08/15/2025	12:00 12:00 12:00	LB136851 LB136851 LB136851



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Metals

- 3a - INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2845

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	08/15/2025	12:30	LB136851
	Iron	23.4	+/-50	U	100	P	08/15/2025	12:30	LB136851
	Lead	2.30	+/-6	U	12.0	P	08/15/2025	12:30	LB136851
CCB02	Copper	4.60	+/-10	U	20.0	P	08/15/2025	13:45	LB136851
	Iron	23.4	+/-50	U	100	P	08/15/2025	13:45	LB136851
	Lead	2.30	+/-6	U	12.0	P	08/15/2025	13:45	LB136851
CCB03	Copper	4.60	+/-10	U	20.0	P	08/15/2025	15:10	LB136851
	Iron	23.4	+/-50	U	100	P	08/15/2025	15:10	LB136851
	Lead	2.30	+/-6	U	12.0	P	08/15/2025	15:10	LB136851
CCB04	Copper	4.60	+/-10	U	20.0	P	08/15/2025	16:01	LB136851
	Iron	23.4	+/-50	U	100	P	08/15/2025	16:01	LB136851
	Lead	2.30	+/-6	U	12.0	P	08/15/2025	16:01	LB136851
CCB05	Copper	4.60	+/-10	U	20.0	P	08/15/2025	16:45	LB136851
	Iron	23.4	+/-50	U	100	P	08/15/2025	16:45	LB136851
	Lead	2.30	+/-6	U	12.0	P	08/15/2025	16:45	LB136851





Metals - 3b -PREPARATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2845

Instrument: P4

		Result	Acceptance	Conc	CRQL		Analysis A	Analysis	
Sample ID	Analyte	(ug/L)	Limit	Qual	ug/L	M	Date	Time	Run
PB169267BL		WATER		Batch Number:	PB169267		Prep Date:	08/15/20)25
	Copper	1.89	<5	U	10.0	P	08/15/2025	15:43	LB136851
	Iron	18.0	<25	U	50.0	P	08/15/2025	15:43	LB136851
	Lead	1.21	<3	U	6.00	P	08/15/2025	15:43	LB136851





Metals - 4 -INTERFERENCE CHECK SAMPLE

Client: Tully Environmental, Inc SDG No.: Q2845

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	-6.62	2.0	331	-18	22	08/15/2025	12:09	LB136851
	Iron	102000	101000	101	85600	116500	08/15/2025	12:09	LB136851
	Lead	-4.50			-12	12	08/15/2025	12:09	LB136851
ICSAB01	Copper	483	511	94	434	588	08/15/2025	12:13	LB136851
	Iron	102000	99300	103	84400	114500	08/15/2025	12:13	LB136851
	Lead	42.4	49.0	86	37	61	08/15/2025	12:13	LB136851
ICSA	Copper	15.1	2.0	755	-18	22	08/15/2025	12:17	LB136851
	Iron	96400	101000	95	85600	116500	08/15/2025	12:17	LB136851
	Lead	-16.5			-12	12	08/15/2025	12:17	LB136851
ICSAB	Copper	507	511	99	434	588	08/15/2025	12:21	LB136851
	Iron	97900	99300	99	84400	114500	08/15/2025	12:21	LB136851
	Lead	53.0	49.0	108	37	61	08/15/2025	12:21	LB136851



METAL QC DATA



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metals - 5a -MATRIX SPIKE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q2845

contract: TULL01 lab code: ACE

matrix: Water sample id: Q2845-04 client id: 002 35th Ave (july)MS

Percent Solids	s for Sample:	NA	Spiked II	D:	Q2845-041	MS	Percent Soli	ids for Spike Sa	mple:	NA
Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Copper	ug/L	75 - 125	222		74.0		150	99		P
Iron	ug/L	75 - 125	7760		5070		1500	180	N	P
Lead	υσ/Ι	75 - 125	445		11 4		500	87		р



ug/L

ug/L

75 - 125

75 - 125

Iron

Lead

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

1500

500

23

85

P

P

N

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metals - 5a -MATRIX SPIKE DUPLICATE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q2845

 contract:
 TULL01
 lab code:
 ACE

 matrix:
 Water
 sample id:
 Q2845-04
 client id:
 002 35th Ave (july)MSD

5420

438

Percent Solids for Spike Sample: Percent Solids for Sample: NA Spiked ID: Q2845-04MSD NA MSD **%** Acceptance Sample Spike Units Limit %R Result Result \mathbf{C} Added Recovery Analyte Qual M Copper ug/L 75 - 125 191 74.0 150 78 P

5070

11.4



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Metals - 5b -POST DIGEST SPIKE SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2845

Contract: TULL01 Lab Code: ACE

Matrix: Water Level: LOW Client ID: 002 35th Ave (july)A

Sample ID: Q2845-04 **Spiked ID:** Q2845-04A

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Iron	ug/L	85 - 115	6020)	5070		1500	63	N	P



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Metals

- 6 -

DUPLICATE SAMPLE SUMMARY

Client: Tully Environmental, Inc Level: LOW SDG No.: Q2845

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q2845-04 Client ID: 002 35th Ave (july)DUP

Percent Solids for Sample: NA Duplicate ID Q2845-04DUP Percent Solids for Spike Sample: NA

		Acceptance	Sample		Duplicate				
Analyte	Units	Limit	Result	C	Result	C	RPD	Qual	M
Copper	ug/L	20	74.0		71.3		4		P
Iron	ug/L	20	5070		4490		12		P
Lead	ug/L	20	11.4		9.05		23		P



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Metals

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DUPLICATE SAMPLE SUMMARY

Client: Tully Environmental, Inc Level: LOW SDG No.: Q2845

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q2845-04MS Client ID: 002 35th Ave (july)MSD

Percent Solids for Sample: NA Duplicate ID Q2845-04MSD Percent Solids for Spike Sample: NA

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M				
Copper	ug/L	20	222		191	l	15		P				
Iron	ug/L	20	7760		5420		5420		5420		36	*	P
Lead	ug/L	20	445		438	3	2		P				



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Metals

- 7 -

LABORATORY CONTROL SAMPLE SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2845

Contract: TULL01 Lab Code: ACE

Analyte	Units	True Value	Result C	% Recovery	Acceptance Limits	M
PB169267BS						
Copper	ug/L	150	155	103	85 - 115	P
Iron	ug/L	1500	1490	99	85 - 115	P
Lead	ug/L	500	470	94	85 - 115	P



Metals

-9 -

ICP SERIAL DILUTIONS

SAMPLE NO.

002 35th Ave (july)L

Lab Name: Al	lliance					Contract:	TULL01	_	
Lab Code: ACI	Е		Lb No.:	lb136851	Lab Sample ID :	Q2845-04L	SDG No.:	Q2845	
Matrix (soil/water):	Water			Level (low/	med):	LOW		
			Concent	tration Units:	ug/L				

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ- ence	Q	M
Copper	74.0		77.		5		P
Iron	5070		4890		3		P
Lead	11.4		12.0	J	5		P



METAL PREPARATION & INSTRUMENT DATA



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Metals - 11 -

ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2845
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	
Interelemen	t Carrection Factors (annaront nnh analyte/n	nm interferent)	

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

	Wave-	ICP I	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.:	Q2845
Contract:	TULL01	Lab Code:	ACE
Instrument	i ID:	Date:	
_			

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

	Wave-	ICP I	nterelement Corre	ection Factors Fo	r:	
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



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Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2845
Contract:	TULL01	Lab Code:	ACE
Instrument	i ID:	Date:	
_			

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

	Wave-	ICP I	nterelement Corre	ection Factors Fo	r:	
Analyte	Length (nm)	Cr	Cu	K	Mn	Мо
Copper	224.700	0.0000000	0.0000000	0.0000000	0.0006510	0.0020500
Iron	240.488	0.0000000	0.0000000	0.0000730	0.0000000	-0.0015250
Lead	220.353	0.0000000	0.0000000	0.0000000	0.0001400	-0.0008600



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Metals - 11 -

ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2845
Contract:	TULL01	Lab Code:	ACE
Instrument ID:		Date:	
Interelemen	t Correction Factors (apparent ppb analyte/p	opm interferent)	

	Wave-	ICP I	nterelement Corro	ection Factors Fo	r:	
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.:	Q2845				
Contract:	TULL01	Lab Code:	ACE				
Instrument	ID:	Date:					
Interelement Correction Factors (apparent ppb analyte/ppm interferent)							

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	Wave-	ICP I				
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



Fax: 908 789 8922

Metals - 13 -SAMPLE PREPARATION SUMMARY

Client:	Tully Environmental, Inc	SDG No.:	Q2845	
Contract:	TULL01	Lab Code:	ACE	Method:

					Initial	Final Sample	
		Sample			Sample	Volume	Percent
Sample ID	Client ID	Туре	Matrix	Prep Date	Size(mL)	(mL)	Solids
Batch Number	: PB169267						
PB169267BL	PB169267BL	MB	WATER	08/15/2025	50.0	25.0	
PB169267BS	PB169267BS	LCS	WATER	08/15/2025	50.0	25.0	
Q2845-01	001 willets Pt Blvd(july)	SAM	WATER	08/15/2025	50.0	25.0	
Q2845-04	002 35th Ave (july)	SAM	WATER	08/15/2025	50.0	25.0	
Q2845-04DUP	002 35th Ave (july)DUP	DUP	WATER	08/15/2025	50.0	25.0	
Q2845-04MS	002 35th Ave (july)MS	MS	WATER	08/15/2025	50.0	25.0	
Q2845-04MSD	002 35th Ave (july)MSD	MSD	WATER	08/15/2025	50.0	25.0	



metals - 14 -

ANALYSIS RUN LOG

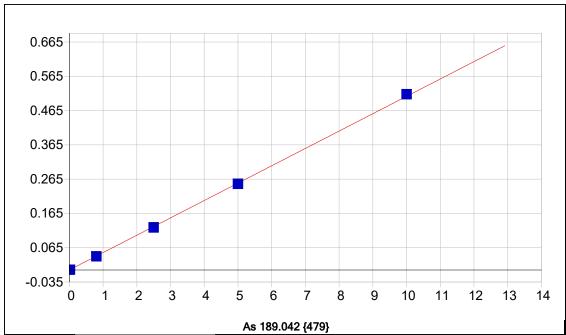
Client:	Tully Environmenta	l, Inc		Contract:	TU	LL01	
Lab code:	ACE			Sdg no.:	Q284	45	
Instrument id number:			Method:	 Run numbe	er:	LB136851	

Start date: 08/15/2025 **End date:** 08/15/2025

tart date.	T	uate.		T
Lab sample id.	Client Sample Id	d/f	Time	Parameter list
S0	S0	1	1125	Cu,Fe,Pb
S1	S1	1	1129	Cu,Fe,Pb
S2	S2	1	1133	Cu,Fe,Pb
S3	S3	1	1137	Cu,Fe,Pb
S4	S4	1	1141	Cu,Fe,Pb
S5	S5	1	1146	Cu,Fe,Pb
ICV01	ICV01	1	1150	Cu,Fe,Pb
LLICV01	LLICV01	1	1156	Cu,Fe,Pb
ICB01	ICB01	1	1200	Cu,Fe,Pb
CRI01	CRI01	1	1204	Cu,Fe,Pb
ICSA01	ICSA01	1	1209	Cu,Fe,Pb
ICSAB01	ICSAB01	1	1213	Cu,Fe,Pb
ICSA	ICSA	20	1217	Cu,Fe,Pb
ICSAB	ICSAB	20	1221	Cu,Fe,Pb
CCV01	CCV01	1	1226	Cu,Fe,Pb
CCB01	CCB01	1	1230	Cu,Fe,Pb
CCV02	CCV02	1	1340	Cu,Fe,Pb
CCB02	CCB02	1	1345	Cu,Fe,Pb
CCV03	CCV03	1	1504	Cu,Fe,Pb
CCB03	CCB03	1	1510	Cu,Fe,Pb
Q2845-01	001 willets Pt Blvd(july)	1	1514	Cu,Fe,Pb
Q2845-04	002 35th Ave (july)	1	1518	Cu,Fe,Pb
Q2845-04DUP	002 35th Ave (july)DUP	1	1523	Cu,Fe,Pb
Q2845-04MS	002 35th Ave (july)MS	1	1531	Cu,Fe,Pb
Q2845-04MSD	002 35th Ave (july)MSD	1	1535	Cu,Fe,Pb
Q2845-04A	002 35th Ave (july)A	1	1539	Fe
PB169267BL	PB169267BL	1	1543	Cu,Fe,Pb
PB169267BS	PB169267BS	1	1547	Cu,Fe,Pb
CCV04	CCV04	1	1555	Cu,Fe,Pb
CCB04	CCB04	1	1601	Cu,Fe,Pb
CCV05	CCV05	1	1638	Cu,Fe,Pb
CCB05	CCB05	1	1645	Cu,Fe,Pb



METAL RAW DATA



Date of Fit: 8/15/2025 13:45:18 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000029 Re-Slope: 1.000000 A1 (Gain): V-int: 0.000000

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

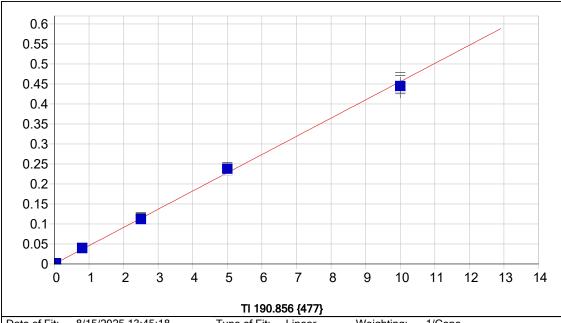
Correlation: 0.999912 Status: OK.

 Std Error of Est:
 0.000016

 Predicted MDL:
 0.002075

 Predicted MQL:
 0.006915

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00003	.000	1
S1	.02000	.01973	000	-1.34	.00102	.000	1
S3	2.5000	2.4454	055	-2.18	.12372	.000	1
S4	5.0000	4.9555	044	890	.25068	.000	1
S5	10.000	10.115	.115	1.15	.51166	.000	1
S2	.80000	.78427	016	-1.97	.03970	.000	1



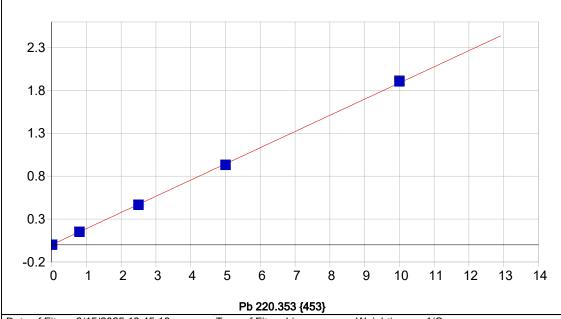
A0 (Offset): 0.000228 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.045548

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

Correlation: 0.999425 OK. Status:

Std Error of Est: 0.000050 Predicted MDL: 0.001963 Predicted MQL: 0.006543

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00023	.000	1
S1	.04000	.04021	.000	.530	.00194	.000	1
S3	2.5000	2.4587	041	-1.65	.11014	.004	1
S4	5.0000	5.2180	.218	4.36	.23374	.004	1
S5	10.000	9.7629	237	-2.37	.43660	.022	1
S2	.80000	.86019	.060	7.52	.03874	.000	1



A0 (Offset): 0.000060 Re-Slope: 1.000000 A1 (Gain): 0.188802 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

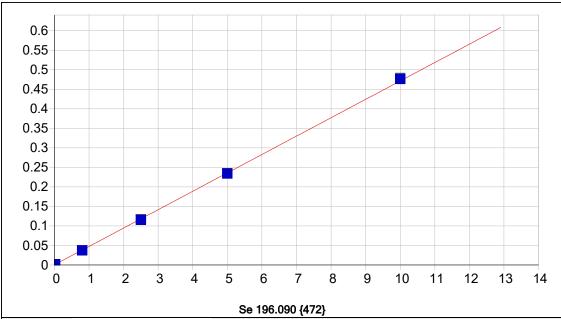
Correlation: 0.999943 Status: OK.

 Std Error of Est:
 0.000037

 Predicted MDL:
 0.001249

 Predicted MQL:
 0.004165

Std. Naı	me Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00006	.000	1
S1	.01200	.01266	.001	5.50	.00241	.000	1
S3	2.5000	2.4703	030	-1.19	.46596	.001	1
S4	5.0000	4.9361	064	-1.28	.93103	.000	1
S5	10.000	10.094	.094	.936	1.9038	.008	1
S2	.80000	.79944	001	070	.15084	.000	1



A0 (Offset): 0.000336 Re-Slope: 1.000000 A1 (Gain): 0.047083 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

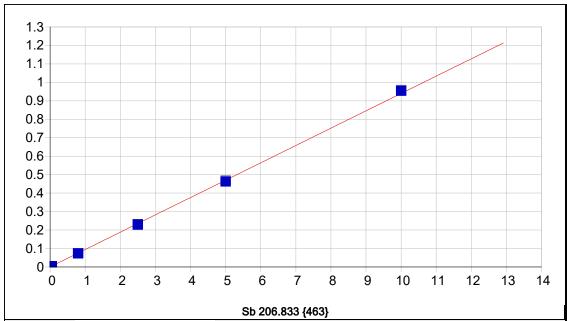
Correlation: 0.999923 Status: OK.

 Std Error of Est:
 0.000014

 Predicted MDL:
 0.002797

 Predicted MQL:
 0.009322

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00034	.000	1
S1	.02000	.02072	.001	3.62	.00131	.000	1
S3	2.5000	2.4469	053	-2.12	.11551	.001	1
S4	5.0000	4.9610	039	780	.23385	.001	1
S5	10.000	10.105	.105	1.05	.47600	.002	1
S2	.80000	.78584	014	-1.77	.03732	.000	1



A0 (Offset): 0.000433 Re-Slope: 1.000000 A1 (Gain): 0.093912 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

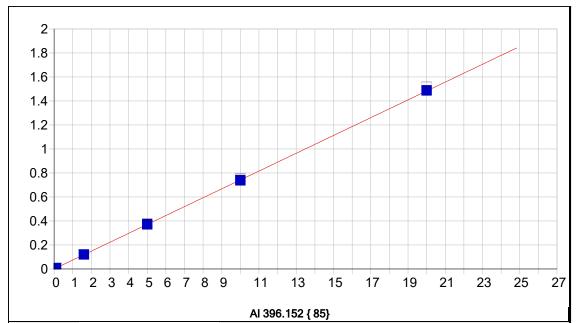
Correlation: 0.999848 Status: OK.

 Std Error of Est:
 0.000061

 Predicted MDL:
 0.001777

 Predicted MQL:
 0.005922

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00043	.000	1
S1	.05000	.05023	.000	.466	.00516	.000	1
S3	2.5000	2.4363	064	-2.55	.22987	.001	1
S4	5.0000	4.9238	076	-1.52	.46411	.002	1
S5	10.000	10.157	.157	1.57	.95682	.001	1
S2	.80000	.78295	017	-2.13	.07417	.000	1



A0 (Offset): 0.000389 Re-Slope: 1.000000 A1 (Gain): 0.074138 Y-int: 0.000000

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

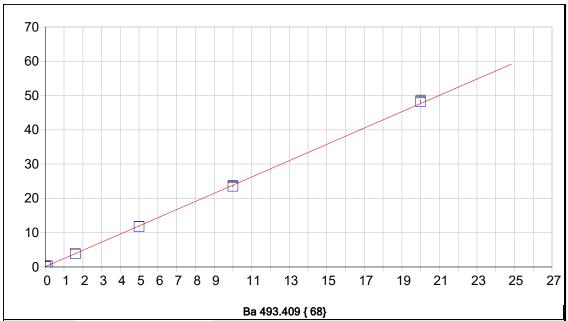
Correlation: 0.999979 Status: OK.

 Std Error of Est:
 0.000036

 Predicted MDL:
 0.009997

 Predicted MQL:
 0.033325

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00039	.000	1
S1	.10000	.10993	.010	9.93	.00911	.001	1
S3	5.0000	4.9904	010	192	.37756	.002	1
S4	10.000	9.9396	060	604	.75167	.001	1
S5	20.000	20.046	.046	.230	1.5153	.001	1
S2	1.6000	1.6134	.013	.840	.12231	.000	1



A0 (Offset): 0.081003 Re-Slope: 1.000000 A1 (Gain): 2.378534 Y-int: 0.000000

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

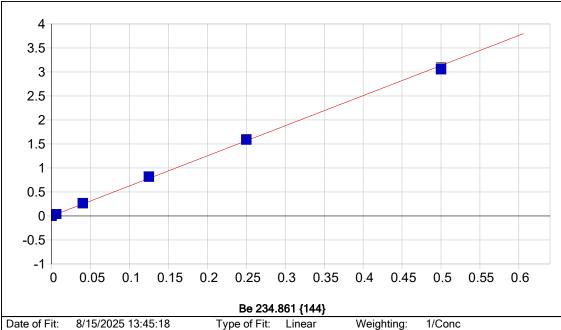
Correlation: 0.999896 Status: OK.

 Std Error of Est:
 0.002540

 Predicted MDL:
 0.000931

 Predicted MQL:
 0.003105

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.08101	.002	1
S1	.10000	.09903	001	971	.31655	.000	1
S3	5.0000	4.9177	082	-1.65	11.778	.021	1
S4	10.000	9.8554	145	-1.45	23.522	.214	1
S5	20.000	20.262	.262	1.31	48.275	.377	1
S2	1.6000	1.5659	034	-2.13	3.8056	.004	1



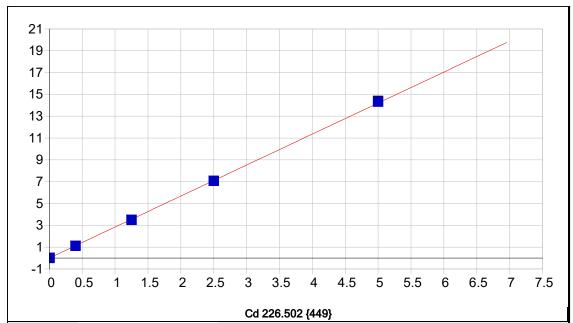
A0 (Offset): -0.001220 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 6.269439

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

Correlation: 0.999576 OK. Status:

Std Error of Est: 0.000523 Predicted MDL: 0.000067 Predicted MQL: 0.000224

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00123	.000	1
S1	.00600	.00666	.001	10.9	.04023	.000	1
S3	.12500	.13031	.005	4.25	.81227	.005	1
S4	.25000	.25380	.004	1.52	1.5829	.003	1
S5	.50000	.48797	012	-2.41	3.0440	.033	1
S2	.04000	.04227	.002	5.67	.26264	.001	1



A0 (Offset): -0.000626 Re-Slope: 1.000000 A1 (Gain): 2.841481 Y-int: 0.000000

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

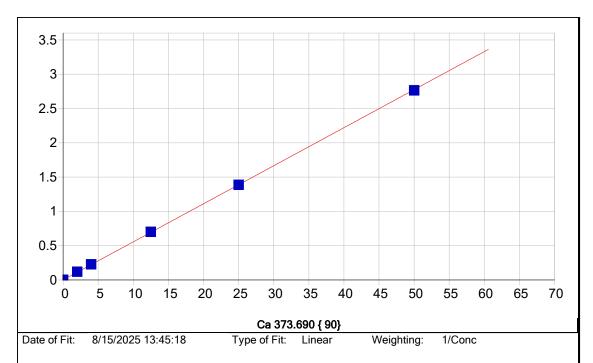
n (Exponent): 1.000000 Correlation: 0.999949 Status: OK.

 Std Error of Est:
 0.000259

 Predicted MDL:
 0.000071

 Predicted MQL:
 0.000236

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00062	.000	1
S1	.00600	.00596	000	737	.01635	.000	1
S3	1.2500	1.2292	021	-1.66	3.4946	.010	1
S4	2.5000	2.4884	012	463	7.0748	.015	1
S5	5.0000	5.0411	.041	.822	14.333	.061	1
S2	.40000	.39128	009	-2.18	1.1119	.001	1



A0 (Offset): 0.001537 Re-Slope: 1.000000 A1 (Gain): 0.055467 Y-int: 0.000000

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

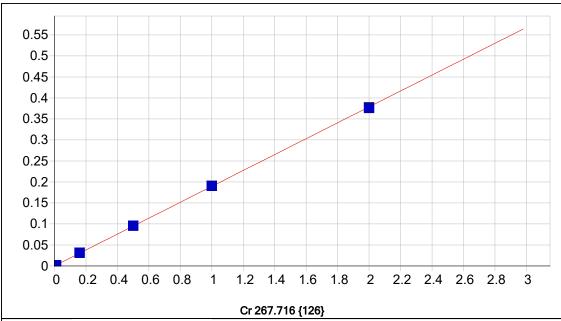
Correlation: 0.999958 Status: OK.

 Std Error of Est:
 0.000268

 Predicted MDL:
 0.010470

 Predicted MQL:
 0.034899

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00014	000	.000	.00153	.000	1
S2	4.0000	4.0708	.071	1.77	.22733	.000	1
S3	12.500	12.592	.092	.738	.70000	.002	1
S4	25.000	24.964	036	144	1.3862	.001	1
S5	50.000	49.775	225	450	2.7624	.004	1
S1	2.0000	2.0978	.098	4.89	.11789	.000	1



A0 (Offset): 0.000198 Re-Slope: 1.000000 A1 (Gain): 0.189259 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

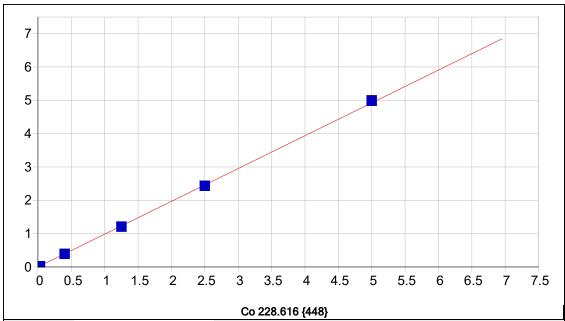
Correlation: 0.999956 Status: OK.

 Std Error of Est:
 0.000013

 Predicted MDL:
 0.000318

 Predicted MQL:
 0.001061

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00020	.000	1
S1	.01000	.01025	.000	2.49	.00214	.000	1
S3	.50000	.50433	.004	.866	.09568	.000	1
S4	1.0000	1.0057	.006	.574	.19062	.000	1
S5	2.0000	1.9851	015	747	.37604	.001	1
S2	.16000	.16462	.005	2.89	.03137	.000	1



A0 (Offset): 0.000208 Re-Slope: 1.000000 A1 (Gain): 0.984566 Y-int: 0.000000

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

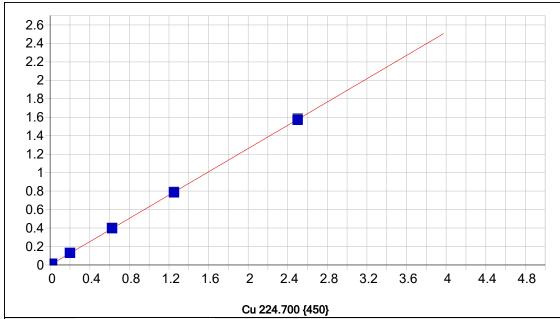
Correlation: 0.999912 Status: OK.

 Std Error of Est:
 0.000266

 Predicted MDL:
 0.000182

 Predicted MQL:
 0.000605

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00021	.000	1
S1	.03000	.02989	000	358	.02951	.000	1
S3	1.2500	1.2252	025	-1.98	1.2086	.002	1
S4	2.5000	2.4723	028	-1.11	2.4385	.002	1
S5	5.0000	5.0595	.059	1.19	4.9899	.015	1
S2	.40000	.39313	007	-1.72	.38794	.001	1



A0 (Offset): 0.000182 Re-Slope: 1.000000 A1 (Gain): 0.630424 Y-int: 0.000000

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

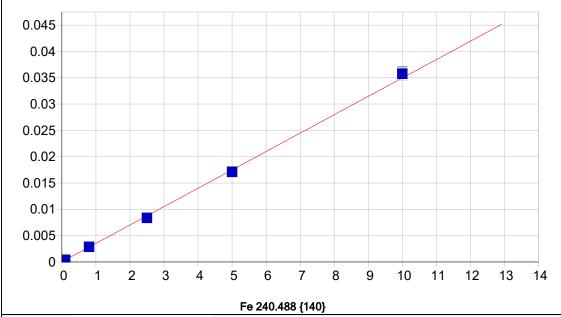
Correlation: 0.999955 Status: OK.

 Std Error of Est:
 0.000070

 Predicted MDL:
 0.000400

 Predicted MQL:
 0.001333

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00018	.000	1
S1	.02000	.02188	.002	9.42	.01412	.000	1
S3	.62500	.62947	.004	.715	.40030	.000	1
S4	1.2500	1.2445	005	438	.79132	.001	1
S5	2.5000	2.4934	007	265	1.5852	.003	1
S2	.20000	.20575	.006	2.87	.13094	.000	1



A0 (Offset): 0.000034 Re-Slope: 1.000000 A1 (Gain): 0.003493 Y-int: 0.000000

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

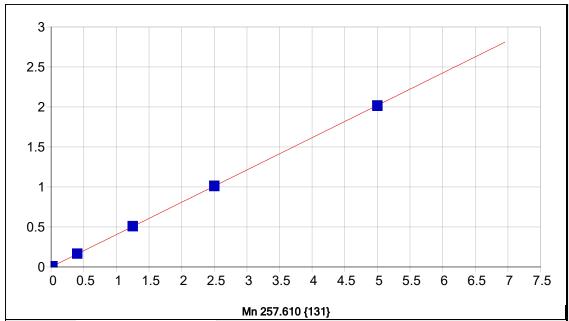
Correlation: 0.999652 Status: OK.

 Std Error of Est:
 0.000005

 Predicted MDL:
 0.005702

 Predicted MQL:
 0.019006

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00003	.000	1
S1	.10000	.09914	001	861	.00038	.000	1
S3	2.5000	2.3816	118	-4.73	.00828	.000	1
S4	5.0000	4.8945	105	-2.11	.01698	.000	1
S5	10.000	10.215	.215	2.15	.03542	.000	1
S2	.80000	.80937	.009	1.17	.00284	.000	1



A0 (Offset): 0.000335 Re-Slope: 1.000000 A1 (Gain): 0.404011 Y-int: 0.000000

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

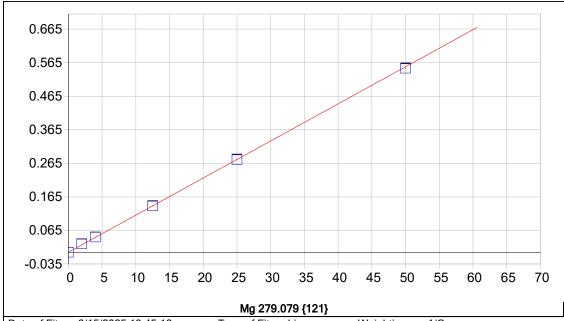
Correlation: 0.999980 Status: OK.

 Std Error of Est:
 0.000043

 Predicted MDL:
 0.000524

 Predicted MQL:
 0.001748

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00033	.000	1
S1	.02000	.02159	.002	7.97	.00906	.000	1
S3	1.2500	1.2560	.006	.481	.50788	.002	1
S4	2.5000	2.4988	001	049	1.0101	.003	1
S5	5.0000	4.9854	015	292	2.0149	.004	1
S2	.40000	.40824	.008	2.06	.16530	.001	1



A0 (Offset): -0.000080 Re-Slope: 1.000000 A1 (Gain): 0.011057 Y-int: 0.000000

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

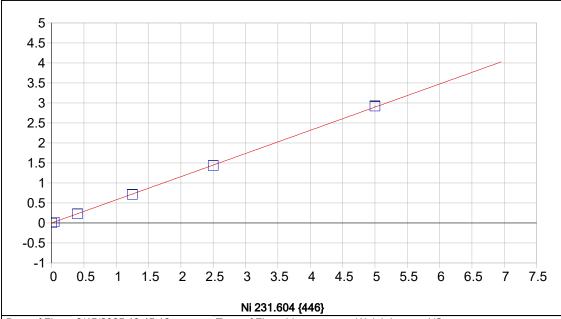
Correlation: 0.999789 Status: OK.

 Std Error of Est:
 0.000120

 Predicted MDL:
 0.024738

 Predicted MQL:
 0.082459

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00029	000	.000	00008	.000	1
S2	4.0000	4.0879	.088	2.20	.04512	.000	1
S3	12.500	12.512	.012	.098	.13827	.001	1
S4	25.000	25.030	.030	.121	.27668	.001	1
S5	50.000	49.608	392	785	.54842	.001	1
S1	2.0000	2.2618	.262	13.1	.02493	.000	1



A0 (Offset): -0.000433 Re-Slope: 1.000000 A1 (Gain): 0.579081 Y-int: 0.000000

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

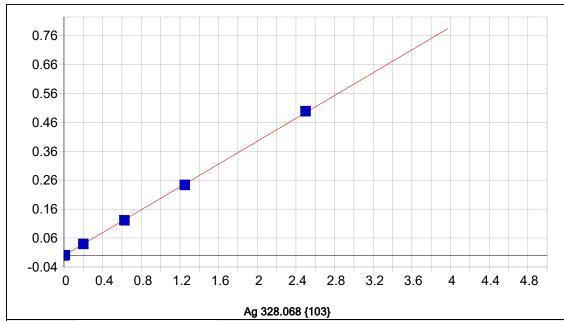
Correlation: 0.999948 Status: OK.

 Std Error of Est:
 0.000139

 Predicted MDL:
 0.000329

 Predicted MQL:
 0.001097

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00043	.000	1
S1	.04000	.04075	.001	1.87	.02316	.000	1
S3	1.2500	1.2322	018	-1.42	.71312	.001	1
S4	2.5000	2.4757	024	972	1.4332	.002	1
S5	5.0000	5.0455	.045	.910	2.9213	.008	1
S2	.40000	.39585	004	-1.04	.22880	.000	1



A0 (Offset): -0.000456 Re-Slope: 1.000000 A1 (Gain): 0.197734 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

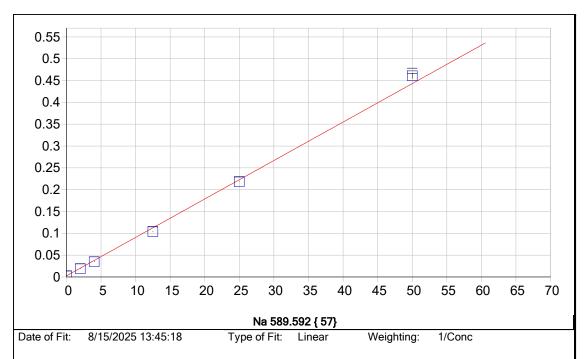
Correlation: 0.999933 Status: OK.

 Std Error of Est:
 0.000019

 Predicted MDL:
 0.000475

 Predicted MQL:
 0.001583

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00046	.000	1
S1	.01000	.01017	.000	1.73	.00154	.000	1
S3	.62500	.61556	009	-1.51	.12066	.000	1
S4	1.2500	1.2337	016	-1.31	.24228	.000	1
S5	2.5000	2.5248	.025	.991	.49638	.001	1
S2	.20000	.20081	.001	.405	.03906	.000	1



A0 (Offset): 0.002561 Re-Slope: 1.000000 A1 (Gain): 0.008807 Y-int: 0.000000

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

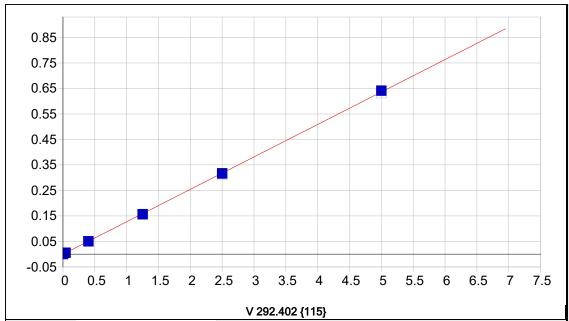
Correlation: 0.998847 Status: OK.

 Std Error of Est:
 0.000224

 Predicted MDL:
 0.016034

 Predicted MQL:
 0.053448

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00045	.000	.000	.00256	.000	1
S2	4.0000	3.6612	339	-8.47	.03480	.000	1
S3	12.500	11.493	-1.01	-8.06	.10378	.000	1
S4	25.000	24.470	530	-2.12	.21807	.000	1
S5	50.000	52.032	2.03	4.06	.46080	.006	1
S1	2.0000	1.8439	156	-7.81	.01880	.000	1



A0 (Offset): -0.000061 Re-Slope: 1.000000 A1 (Gain): 0.127206 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

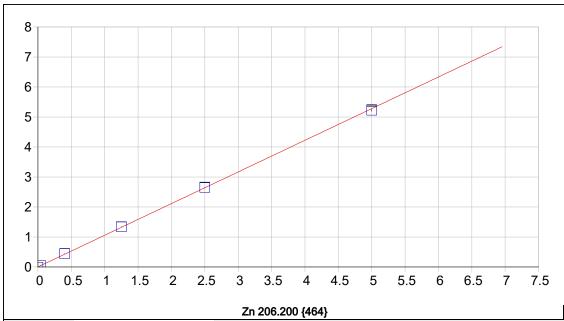
Correlation: 0.999963 Status: OK.

 Std Error of Est:
 0.000025

 Predicted MDL:
 0.002521

 Predicted MQL:
 0.008404

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00006	.000	1
S1	.04000	.03917	001	-2.08	.00473	.000	1
S3	1.2500	1.2322	018	-1.43	.15436	.001	1
S4	2.5000	2.4844	016	622	.31134	.001	1
S5	5.0000	5.0371	.037	.743	.63142	.001	1
S2	.40000	.39707	003	732	.04971	.000	1



A0 (Offset): 0.001537 Re-Slope: 1.000000 A1 (Gain): 1.055167 Y-int: 0.000000

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

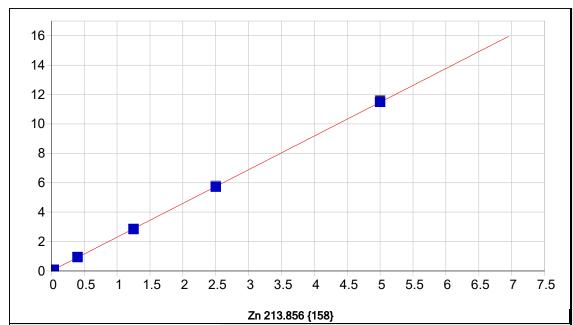
Correlation: 0.999884 Status: OK.

 Std Error of Est:
 0.000377

 Predicted MDL:
 0.000144

 Predicted MQL:
 0.000481

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00153	.000	1
S1	.04000	.04286	.003	7.15	.04676	.000	1
S3	1.2500	1.2682	.018	1.46	1.3397	.001	1
S4	2.5000	2.5113	.011	.452	2.6514	.008	1
S5	5.0000	4.9471	053	-1.06	5.2216	.030	1
S2	.40000	.42047	.020	5.12	.44520	.001	1



A0 (Offset): 0.004361 Re-Slope: 1.000000 A1 (Gain): 2.294118 Y-int: 0.000000

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

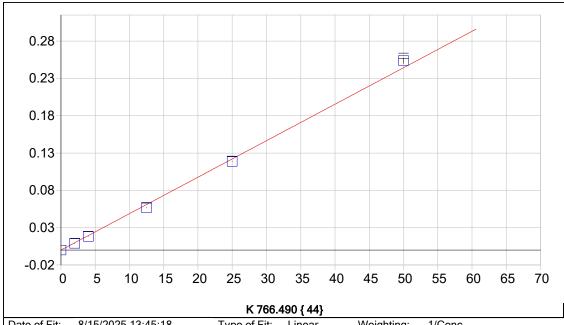
Correlation: 0.999981 Status: OK.

 Std Error of Est:
 0.000333

 Predicted MDL:
 0.000233

 Predicted MQL:
 0.000775

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00436	.000	1
S1	.04000	.04211	.002	5.27	.10160	.001	1
S3	1.2500	1.2382	012	945	2.8649	.008	1
S4	2.5000	2.4955	005	181	5.7692	.009	1
S5	5.0000	5.0076	.008	.152	11.572	.026	1
S2	.40000	.40660	.007	1.65	.94353	.003	1



8/15/2025 13:45:18 Date of Fit: Type of Fit: Linear Weighting: 1/Conc

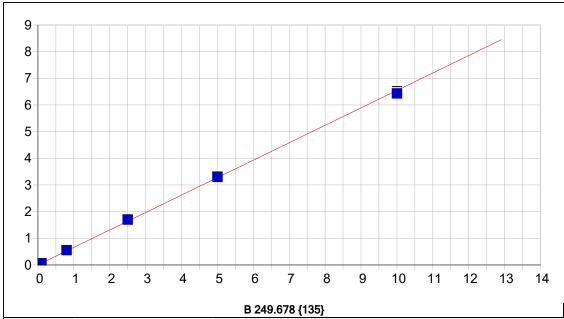
A0 (Offset): -0.000099 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.004888

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

Correlation: 0.999029 OK. Status:

Std Error of Est: 0.000114 Predicted MDL: 0.034449 Predicted MQL: 0.114831

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00039	.000	.000	00010	.000	1
S2	4.0000	3.7484	252	-6.29	.01822	.000	1
S3	12.500	11.627	873	-6.99	.05673	.000	1
S4	25.000	24.337	663	-2.65	.11886	.000	1
S5	50.000	51.942	1.94	3.88	.25380	.003	1
S1	2.0000	1.8462	154	-7.69	.00893	.000	1



A0 (Offset): 0.004746 Re-Slope: 1.000000 A1 (Gain): 0.653946 Y-int: 0.000000

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

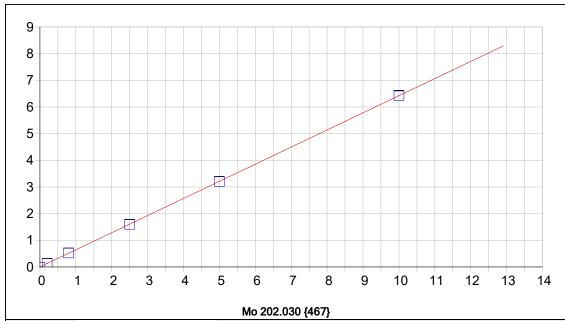
Correlation: 0.999775 Status: OK.

 Std Error of Est:
 0.000725

 Predicted MDL:
 0.000695

 Predicted MQL:
 0.002316

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00474	.001	1
S1	.10000	.10533	.005	5.33	.07324	.001	1
S3	2.5000	2.5862	.086	3.45	1.6901	.008	1
S4	5.0000	5.0386	.039	.772	3.2879	.010	1
S5	10.000	9.8317	168	-1.68	6.4106	.081	1
S2	.80000	.83818	.038	4.77	.55099	.001	1



A0 (Offset): 0.000496 Re-Slope: 1.000000 A1 (Gain): 0.642103 Y-int: 0.000000

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

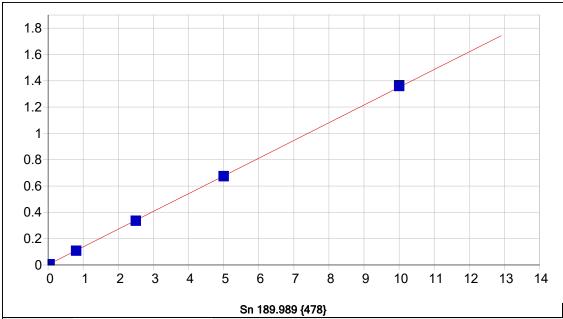
Correlation: 0.999987 Status: OK.

 Std Error of Est:
 0.000246

 Predicted MDL:
 0.000248

 Predicted MQL:
 0.000827

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00049	.000	1
S1	.20000	.20559	.006	2.80	.13251	.000	1
S3	2.5000	2.4836	016	655	1.5952	.003	1
S4	5.0000	4.9906	009	188	3.2050	.005	1
S5	10.000	10.007	.007	.074	6.4263	.013	1
S2	.80000	.81274	.013	1.59	.52236	.001	1



A0 (Offset): 0.002426 Re-Slope: 1.000000 A1 (Gain): 0.134829 Y-int: 0.000000

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

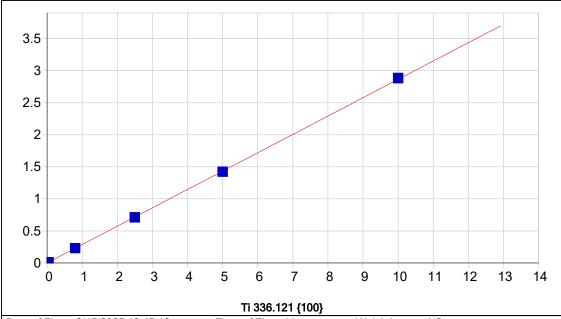
Correlation: 0.999959 Status: OK.

 Std Error of Est:
 0.000040

 Predicted MDL:
 0.000629

 Predicted MQL:
 0.002096

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00243	.000	1
S1	.04000	.03877	001	-3.08	.00765	.000	1
S3	2.5000	2.4679	032	-1.28	.33483	.001	1
S4	5.0000	4.9809	019	383	.67330	.002	1
S5	10.000	10.072	.072	.717	1.3590	.005	1
S2	.80000	.78072	019	-2.41	.10758	.000	1



A0 (Offset): 0.001307 Re-Slope: 1.000000 A1 (Gain): 0.286299 Y-int: 0.000000

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

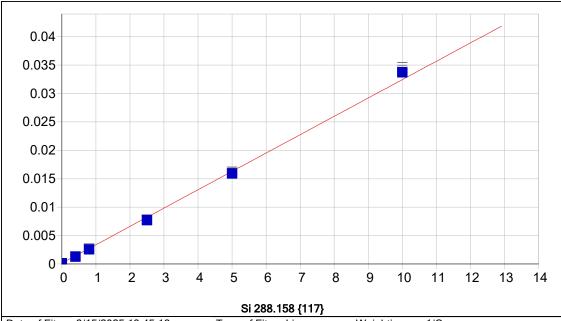
Correlation: 0.999976 Status: OK.

 Std Error of Est:
 0.000066

 Predicted MDL:
 0.001456

 Predicted MQL:
 0.004855

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00131	.000	1
S1	.04000	.03988	000	288	.01272	.000	1
S3	2.5000	2.4765	023	940	.71007	.002	1
S4	5.0000	4.9636	036	728	1.4219	.002	1
S5	10.000	10.063	.063	.627	2.8812	.004	1
S2	.80000	.79729	003	339	.22949	.001	1



A0 (Offset): 0.000148 Re-Slope: 1.000000 A1 (Gain): 0.003230 Y-int: 0.000000

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

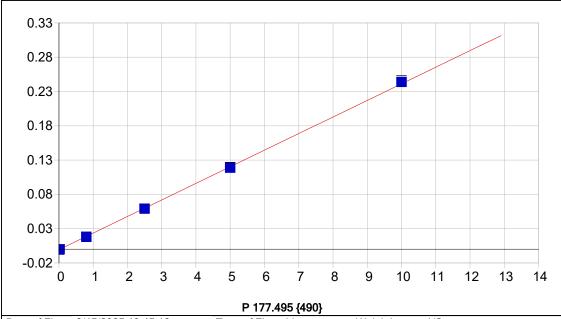
Correlation: 0.998988 Status: OK.

 Std Error of Est:
 0.000016

 Predicted MDL:
 0.011055

 Predicted MQL:
 0.036851

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00010	.000	.000	.00015	.000	1
S1	.40000	.35077	049	-12.3	.00128	.000	1
S3	2.5000	2.3340	166	-6.64	.00781	.000	1
S4	5.0000	4.8819	118	-2.36	.01616	.000	1
S5	10.000	10.389	.389	3.89	.03419	.000	1
S2	.80000	.74360	056	-7.05	.00259	.000	1



A0 (Offset): -0.000633 Re-Slope: 1.000000 A1 (Gain): 0.024184 Y-int: 0.000000

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

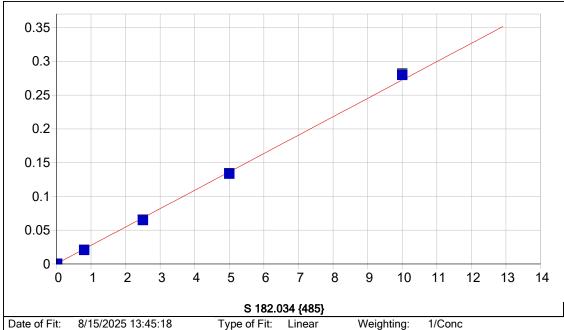
Correlation: 0.999913 Status: OK.

 Std Error of Est:
 0.000007

 Predicted MDL:
 0.002630

 Predicted MQL:
 0.008767

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00063	.000	1
S1	.02000	.01951	000	-2.44	00016	.000	1
S3	2.5000	2.4683	032	-1.27	.05905	.000	1
S4	5.0000	4.9438	056	-1.12	.11891	.001	1
S5	10.000	10.114	.114	1.14	.24393	.002	1
S2	.80000	.77418	026	-3.23	.01809	.000	1



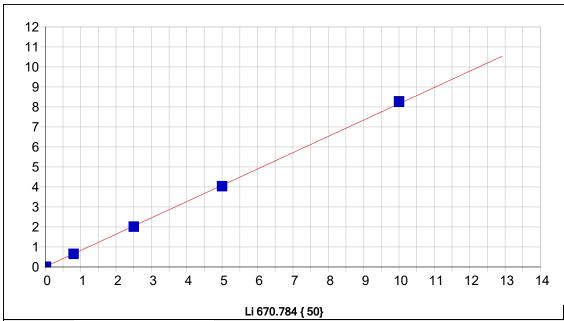
A0 (Offset): 0.000357 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.027190

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

Correlation: 0.999421 OK. Status:

Std Error of Est: 0.000022 Predicted MDL: 0.002826 Predicted MQL: 0.009420

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00001	.000	.000	.00036	.000	1
S1	.02000	.01641	004	-18.0	.00078	.000	1
S3	2.5000	2.3726	127	-5.10	.06469	.000	1
S4	5.0000	4.8991	101	-2.02	.13321	.001	1
S5	10.000	10.286	.286	2.86	.27934	.002	1
S2	.80000	.74529	055	-6.84	.02056	.000	1



A0 (Offset): 0.008192 Re-Slope: 1.000000 A1 (Gain): 0.815049 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

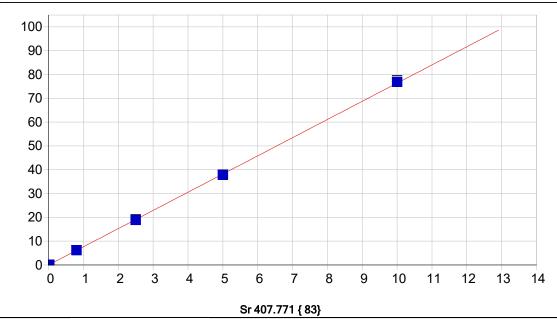
Correlation: 0.999908 Status: OK.

 Std Error of Est:
 0.000259

 Predicted MDL:
 0.001698

 Predicted MQL:
 0.005660

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00819	.001	1
S5	10.000	10.123	.123	1.23	8.2655	.020	1
S4	5.0000	4.9320	068	-1.36	4.0313	.006	1
S3	2.5000	2.4567	043	-1.73	2.0122	.006	1
S1	.02000	.01936	001	-3.19	.02426	.001	1
S2	.80000	.78882	011	-1.40	.65164	.001	1



A0 (Offset): 0.000918 Re-Slope: 1.000000 A1 (Gain): 7.639067 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

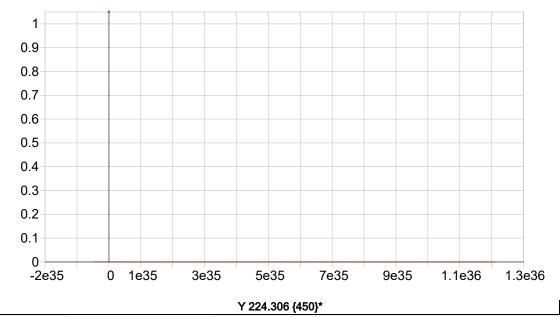
Correlation: 0.999965 Status: OK.

 Std Error of Est:
 0.001497

 Predicted MDL:
 0.000093

 Predicted MQL:
 0.000311

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00092	.000	1
S1	.02000	.02032	.000	1.62	.15691	.000	1
S3	2.5000	2.4737	026	-1.05	18.916	.219	1
S4	5.0000	4.9512	049	977	37.860	.108	1
S5	10.000	10.068	.068	.676	76.982	.604	1
S2	.80000	.80720	.007	.900	6.1730	.006	1



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

Conc.	Conc.						-
1							
0.9							
0.8							
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

% Diff.

(S)IR

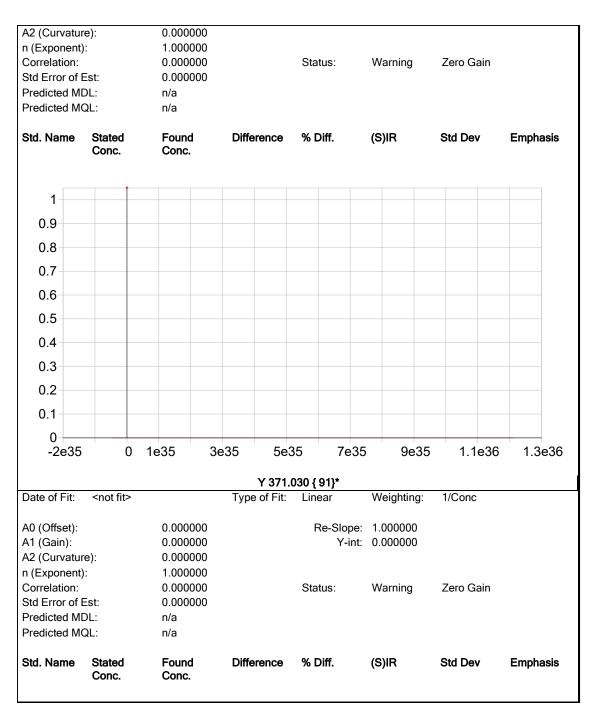
Std Dev

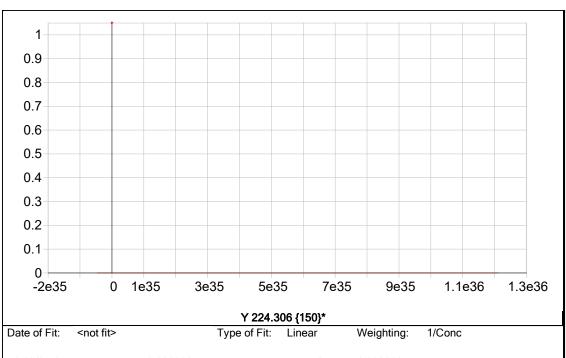
Emphasis

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): V-int: 0.000000





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

Stated

Std. Name

4	•							
1								
0.9								
8.0								
0.7								
0.6								
0.5								
0.4								
0.3								
0.2								
0.1								
0 -2e35	0 16	e35	3e35	e35	35	35	e36	1.3e

% Diff.

(S)IR

Std Dev

Emphasis

In 230.606 {446}*

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

A0 (Offset): 0.000000 Re-Slope: 1.000000 A1 (Gain): 7-int: 0.000000

Reviewed By: On: Inst Id :P4 LB :LB136851

A2 (Curvature): 0.000000 n (Exponent): 1.000000 Correlation: 0.000000 Warning Zero Gain Status: 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:

08/15/2025

Time: 10:02

Temp: 96 °C

Matrix:

WATER

End Digest Date:

08/15/2025

Time: 13:15 Temp:

Temp: 96 °C

Pippete ID:

ICP A

Digestion tube ID:

M5595

Balance ID :

N/A

Block thermometer ID:

10030

Filter paper ID:

N/A

Dig Technician Signature:

MET-DIG. #1

pH Strip ID:

M6069

Supervisor Signature:

50

Hood ID:

#3

Temp:

1. 96°C 2. N/A

Block ID:

1. HOT BLOCK #1

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	MP85156
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
08115/25/14/15	Stas met dia	CS7 longle Rt Lat
	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
PB169267BL	PBW267	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	9
PB169267BS	LCS267	<2	50	25	Colorless	Colorless	Clear	Clear	M6180,M6181	10
Q2845-01	001 WILLETS PT BLVD(JULY)	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	11
Q2845-04	002 35TH AVE (JULY)	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	12
Q2845-04MS	002 35TH AVE (JULY)MS	<2	50	25	Colorless	Colorless	Clear	Clear	M6180,M6181	14
Q2845-04MSD	002 35TH AVE (JULY)MSD	<2	50	25	Colorless	Colorless	Clear	Clear	M6180,M6181	15
Q2845-04DUP	002 35TH AVE (JULY)DUP	<2	50	25	Colorless	Coloriess	Clear	Clear	N/A	13

WORKLIST(Hardcopy Internal Chain)

WorkList Name: PB169267 WorkList ID: 191303 Department: Digestion

08/12/2025 200.7	J11	וטבנטיו	7 > Ld 0) cOM1 111	The state of the s			
		1 2	1:1 HNO3 to 5H / 2	Water Metals Group 10	Water	002 35th Ave (july)	Q2845-04
	J11	TULL01	1:1 HNO3 to pH < 2	Water Metals Group 10	Water	out willets Pt Blvd(july)	0-0-0-0-1
							03845.04
	Location						
	Storage	Customer	Preservative	Issi	Isal XIIIPIN	Customer Sample	
"	Raw Sample				Martin		Sample

Date/Time 08/15/15 10:05 Raw Sample Relinquished by: Raw Sample Received by: Stance dis (so em)

> Date/Time 08/15/25

Raw Sample Received by:

Date: 08-15-2025 09:46:37

Cosen

70/11

Sis mot vig



Fax: 908 789 8922

Instrument ID: P4

Daily Analysis Runlog For Sequence/QCBatch ID # LB136851

Review By	Janvi	Review On	8/18/2025 9:22:39 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86640,MP86656,MP	86653,MP86643,MP86642,MP86641	
ICV Standard	MP86752,MP86656		
CCV Standard	MP86646		
ICSA Standard	MP86651,MP86753		
CRI Standard	MP86656		
LCS Standard			
Chk Standard	MP86647,MP86648		

Sr#	SampleId	ClientID	QcType	Date	Comment	Operator	Status
1	S0	S0	CAL1	08/15/25 11:25		Jaswal	ОК
2	S1	S1	CAL2	08/15/25 11:29		Jaswal	ОК
3	S2	S2	CAL3	08/15/25 11:33		Jaswal	ОК
4	S3	S3	CAL4	08/15/25 11:37		Jaswal	ОК
5	S4	S4	CAL5	08/15/25 11:41		Jaswal	ОК
6	S5	S5	CAL6	08/15/25 11:46		Jaswal	ОК
7	ICV01	ICV01	ICV	08/15/25 11:50		Jaswal	ОК
8	LLICV01	LLICV01	LLICV	08/15/25 11:56		Jaswal	ОК
9	ICB01	ICB01	ICB	08/15/25 12:00		Jaswal	ОК
10	CRI01	CRI01	CRDL	08/15/25 12:04		Jaswal	ОК
11	ICSA01	ICSA01	ICSA	08/15/25 12:09		Jaswal	ОК
12	ICSAB01	ICSAB01	ICSAB	08/15/25 12:13		Jaswal	ОК
13	ICSADL	ICSADL	ICSA	08/15/25 12:17		Jaswal	ОК
14	ICSABDL	ICSABDL	ICSAB	08/15/25 12:21		Jaswal	ОК
15	CCV01	CCV01	CCV	08/15/25 12:26		Jaswal	ОК
16	CCB01	CCB01	ССВ	08/15/25 12:30		Jaswal	ОК
17	PB169247BL	PB169247BL	МВ	08/15/25 12:49		Jaswal	ОК
18	PB169247BS	PB169247BS	LCS	08/15/25 12:53		Jaswal	ОК



Instrument ID: P4

Daily Analysis Runlog For Sequence/QCBatch ID # LB136851

Review By	Janvi	Review On	8/18/2025 9:22:39 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86640,MP86656,MP	86653,MP86643,MP86642,MP86641	
ICV Standard	MP86752,MP86656		
CCV Standard	MP86646		
ICSA Standard	MP86651,MP86753		
CRI Standard	MP86656		
LCS Standard			
Chk Standard	MP86647,MP86648		

19	Q2838-01	TP-11	SAM	08/15/25 12:57	Jaswal	ок
20	Q2838-05	TP-10	SAM	08/15/25 13:01	Jaswal	ок
21	Q2844-01	PAD-081325	SAM	08/15/25 13:05	Jaswal	ок
22	Q2844-06	MOO-25-0223	SAM	08/15/25 13:09	Jaswal	ок
23	Q2853-01	Tr-5-081325	SAM	08/15/25 13:14	Jaswal	ок
24	Q2855-01	#454	SAM	08/15/25 13:18	Jaswal	ОК
25	Q2857-03	72-12002	SAM	08/15/25 13:22	Jaswal	ОК
26	CCV02	CCV02	CCV	08/15/25 13:40	Jaswal	ОК
27	CCB02	CCB02	ССВ	08/15/25 13:45	Jaswal	ОК
28	PB169181BL	PB169181BL	MB	08/15/25 14:32	Jaswal	ОК
29	PB169181BS	PB169181BS	LCS	08/15/25 14:51	Jaswal	ОК
30	CCV03	CCV03	CCV	08/15/25 15:04	Jaswal	ОК
31	CCB03	CCB03	ССВ	08/15/25 15:10	Jaswal	ОК
32	Q2845-01	001 willets Pt Blvd(july	SAM	08/15/25 15:14	Jaswal	ок
33	Q2845-04	002 35th Ave (july)	SAM	08/15/25 15:18	Jaswal	ОК
34	Q2845-04DUP	002 35th Ave (july)DU	DUP	08/15/25 15:23	Jaswal	ОК
35	Q2845-04L	002 35th Ave (july)L	SD	08/15/25 15:27	Jaswal	ОК
36	Q2845-04MS	002 35th Ave (july)MS	MS	08/15/25 15:31	Jaswal	ок
37	Q2845-04MSD	002 35th Ave (july)MS	MSD	08/15/25 15:35	Jaswal	ОК



Fax: 908 789 8922

Instrument ID: P4

Daily Analysis Runlog For Sequence/QCBatch ID # LB136851

Review By	Janvi	Review On	8/18/2025 9:22:39 AM
Supervise By		Supervise On	
			4
STD. NAME	STD REF.#		
ICAL Standard	MP86640,MP86656,M	P86653,MP86643,MP86642,MP86641	
ICV Standard	MP86752,MP86656		
CCV Standard	MP86646		
ICSA Standard	MP86651,MP86753		
CRI Standard	MP86656		
LCS Standard			
Chk Standard	MP86647,MP86648		

38	Q2845-04A	002 35th Ave (july)A	PS	08/15/25 15:39	0.1ml of each M6004 and M6017 is 10ml sample.	Jaswal	OK
39	PB169267BL	PB169267BL	МВ	08/15/25 15:43		Jaswal	ок
40	PB169267BS	PB169267BS	LCS	08/15/25 15:47		Jaswal	ОК
41	PB169268BL	PB169268BL	МВ	08/15/25 15:51		Jaswal	ОК
42	CCV04	CCV04	CCV	08/15/25 15:55		Jaswal	ОК
43	CCB04	CCB04	ССВ	08/15/25 16:01		Jaswal	ОК
44	PB169268BS	PB169268BS	LCS	08/15/25 16:05		Jaswal	ОК
45	Q2857-01	4023	SAM	08/15/25 16:09		Jaswal	ОК
46	Q2857-02	3919	SAM	08/15/25 16:13		Jaswal	ОК
47	Q2857-02DUP	3919DUP	DUP	08/15/25 16:17		Jaswal	ОК
48	Q2857-02L	3919L	SD	08/15/25 16:22		Jaswal	ОК
49	Q2857-02MS	3919MS	MS	08/15/25 16:26		Jaswal	ок
50	Q2857-02MSD	3919MSD	MSD	08/15/25 16:30		Jaswal	ок
51	Q2857-02A	3919A	PS	08/15/25 16:34	0.1ml of each M6004 and M6017 is 10ml sample.	Jaswal	OK
52	CCV05	CCV05	ccv	08/15/25 16:38		Jaswal	ок
53	CCB05	CCB05	ССВ	08/15/25 16:45		Jaswal	ок



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Prep Standard - Chemical Standard Summary

Order ID:	Q2845
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Test: Metals Group 10

Prepbatch ID: PB169267,

Sequence ID/Qc Batch ID: LB136851,

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Star			

MP85156, MP86640, MP86641, MP86642, MP86643, MP86646, MP86647, MP86648, MP86651, MP86653, MP86655, M

Chemical ID:

M5467, M5658, M5697, M5748, M5798, M5799, M5800, M5801, M5805, M5814, M5816, M5820, M5962, M5969, M5970, M5979, M5985, M5998, M6021, M6023, M6027, M6028, M6030, M6032, M6058, M6076, M6077, M6086, M6128, M6137, M6140, M6142, M6144, M6145, M6146, M6151, M6158, M6159, M6162, M6163, M6164, M6165, M6171, M6174, M6176, M6177, M6178, M6179, M6180, M6181, M6182, M6184, W3112,





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabiit Jaswal
170	1:1HCL	MP85156	04/07/2025	09/06/2025	Kareem	None	None	,
					Khairalla			04/07/2025
FROM	1250 00000ml of M6151 + 1250 0000	00ml of W31	112 = Final Q	uantity: 2500 0	00 ml			

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Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
902	ICP AES CAL BLK (SO/ICB/CCB)	MP86640	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

FROM 125.00000ml of M6151 + 2350.00000ml of W3112 + 25.00000ml of M6162 = Final Quantity: 2500.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	Prepared			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
907	ICP AES STD S (S5)	MP86641	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP	•
							ETTE_1 (ICP	08/07/2025
							A)	

FROM

5.00000ml of M5467 + 5.00000ml of M5820 + 5.00000ml of M5969 + 5.00000ml of M5970 + 5.00000ml of M6077 + 5.00000ml of M6146 + 5.00000ml of M6174 + 5.00000ml of M6176 + 455.00000ml of MP86640 = Final Quantity: 500.000 ml

Recipe				Expiration	Prepared			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
910	ICP AES STD S4	MP86642	08/06/2025	08/18/2025	Janvi Patel	None	METALS_PIP	
							ETTE_1 (ICP	08/07/2025
			<u> </u>				A)	•

FROM 50.00000ml of MP86640 + 50.00000ml of MP86641 = 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>PipetteID</u>	Supervised By Sarabjit Jaswal
909	ICP AES STD S3	MP86643	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE 1 (ICP	
	05 00000 of MD00044 + 75 00000	mal of MDOC	340 - Final O		0!		A)	00/01/2023

FROM 25.00000ml of MP86641 + 75.00000ml of MP86640 = Final Quantity: 100.000 ml

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
911	ICP AES CCV SOLN	MP86646	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•
							A)	

FROM 50.00000ml of MP86640 + 50.00000ml of MP86641 = 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	
919	ICP AES INTERNAL STD	MP86647	08/06/2025	08/27/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP		
A)									

FROM 1.00000ml of M6179 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M6162 = Final Quantity: 2000.000 ml

903 ICP AES RINSE SOLN MP86648 08/06/2025 08/27/2025 Janvi Patel None METALS_PIP	Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
					<u> </u>		None	METALS_PIP	

FROM 200.0000ml of M6162 + 9800.0000ml of W3112 = Final Quantity: 10000.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
904	ICP AES ICSA SOLN	MP86651	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3913	ICP AES STD S2	MP86653	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	,

FROM 4.00000ml of MP86641 + 46.00000ml of MP86640 = Final Quantity: 50.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
2950	ICP AES S1/CRI STOCK STD	MP86655	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	08/07/2025

FROM

 $0.00000ml\ of\ M5748+0.00000ml\ of\ M5805+0.03000ml\ of\ M5798+0.03000ml\ of\ M6028+0.05000ml\ of\ M5658+0.05000ml\ of\ M6030+0.05000ml\ of\ M6140+0.05000ml\ of\ M6159+0.06000ml\ of\ M6177+0.10000ml\ of\ M5697+0.10000ml\ of\ M5697+0.10000ml\ of\ M5801+0.10000ml\ of\ M5816+0.10000ml\ of\ M5820+0.10000ml\ of\ M5962+0.10000ml\ of\ M5970+0.10000ml\ of\ M6128+0.10000ml\ of\ M6176+0.15000ml\ of\ M5800+0.20000ml\ of\ M5799+0.20000ml\ of\ M5979+0.20000ml\ of\ M6021+0.20000ml\ of\ M6021+0.20000ml\ of\ M6023+0.20000ml\ of\ M6027+0.20000ml\ of\ M6145+0.25000ml\ of\ M6146+0.50000ml\ of\ M6146+0.50000ml\ of\ M6171+1.00000ml\ of\ M6171+1.00000ml\ of\ M6171+1.00000ml\ of\ M6171+2.00000ml\ of\ M6171+2.00000$

Recipe ID	NAME.	NO.	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2951	ICP AES S1/CRI WORK STD	MP86656	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

FROM 1.00000ml of MP86655 + 49.00000ml of MP86640 = Final Quantity: 50.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
4163	NEW ICV-060925		08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•
							A)	

FROM 0.20000ml of M6058 + 0.40000ml of M6163 + 0.40000ml of M6164 + 0.40000ml of M6165 + 48.60000ml of MP86640 = Final Quantity: 50.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3494	ICP AES ICSAB SOLN-1	MP86753	08/06/2025	08/18/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

FROM 0.05000ml of M6076 + 5.00000ml of M6182 + 5.00000ml of M6184 + 39.95000ml of MP86640 = Final Quantity: 100.000 ml



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57058 / Cerium, 1000PPM, 100ML	020623	02/06/2026	03/06/2023 / bin	03/01/2023 / bin	M5467
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 #
Absolute Standards, Inc.	/ Nickel (Ni) 1000PPM	091223	09/12/2026	01/02/2024 / bin	12/20/2023 / jaswal	M5748
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
	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier						



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.	58120 / Ca, 10000 PPM, 500 ml	122223	12/22/2026	04/17/2025 / Janvi	01/03/2024 / jaswal	M5805
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57005 / B, 1000 PPM, 125 ml	071123	07/11/2026	03/26/2024 / Sohil	01/03/2024 / jaswal	M5814
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57016 / S, 1000 PPM, 125 ml	122923	12/29/2026	05/20/2024 / Jaswal	02/09/2024 / jaswal	M5816
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820



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 #
Absolute Standards, Inc.	57016 / S, 1000 PPM, 125 ml	122923	03/31/2026	03/31/2025 / kareem	06/11/2024 / Jaswal	M5969
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57003 / Li, 1000 PPM, 125 ml	061224	06/21/2027	07/01/2024 / Jaswal	07/01/2024 / Jaswal	M5970
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	08/05/2026	08/06/2025 / Janvi	02/22/2024 / Jaswal	M5979
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGIN10-5 / INDIUM 1 x 500 ml	U2-IN729349	02/21/2028	10/08/2024 / Jaswal	06/14/2024 / Jaswal	M5985
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB727800	07/30/2026	07/30/2025 / Janvi	02/22/2024 / kareem	M5998



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.	57028 / Ni, 1000 PPM, 125 ml	062024	06/20/2027	06/04/2025 / Janvi	08/05/2024 / Jaswal	M6027
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
	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Supplier						



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti	V2-MEB746173	01/29/2026	01/29/2025 / JANVI	08/22/2024 / Jaswal	M6058
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	V2-MEB746762	01/01/2026	01/01/2025 / kareem	09/19/2024 / kareem	M6076
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	V2-MEB746762	09/06/2029	01/23/2025 / kareem	09/19/2024 / kareem	M6077
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58120 / Calcium, 500 ml, 10000 PPM	082324	08/23/2027	03/06/2025 / JANVI	10/14/2024 / jaswal	M6086
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 / Received By	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	072424	07/24/2027	01/23/2025 / kareem	01/13/2025 / Jaswal	M6144
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	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 / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	071724	07/17/2027	01/31/2025 / kareem	10/18/2024 / kareem	M6146
	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier						



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	09/09/2025	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 / Al, 10000 PPM, 500 ml	011325	03/18/2026	03/18/2025 / kareem	02/09/2025 / kareem	M6159
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)	24H0162012	11/27/2025	05/27/2025 / Sagar	04/27/2025 / Sagar	M6162
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	QCP-CICV-1-125ML / EPA CLP ICP Verification Standard1	V2-MEB744107	06/08/2026	06/09/2025 / jaswal	06/06/2025 / jaswal	M6163
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	QCP-CICV-2-125ML / EPA CLP ICP Verification Standard2	U2-MEB733713	06/08/2026	06/09/2025 / jaswal	06/09/2025 / jaswal	M6164
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	CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL	V2-MEB742428	07/31/2026	07/31/2025 / Janvi	05/05/2025 / Janvi	M6174
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 #
Absolute Standards, Inc.	/ Lead (Pb) 1000PPM	031525	03/15/2028	08/06/2025 / Janvi	08/06/2025 / Janvi	M6177
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57042 / Mo, 1000 PPM, 125 ml	080528	08/05/2028	08/06/2025 / Janvi	08/06/2025 / Janvi	M6178
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	CGY10-1 / YTTRIUM 125mL 10,000ug/mL	V2-Y740548	08/05/2026	08/06/2025 / Janvi	06/02/2024 / Janvi	M6179



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 (ICP) STOCK SOLN	ICSA-1211	02/05/2026	08/06/2025 / Janvi	03/06/2024 / Janvi	M6182
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSAB (ICP) STOCK SOLN	ICSB-0710	02/05/2026	08/06/2025 / Janvi	03/06/2024 / Janvi	M6184
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 / Iwona	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

m/z->	N En En	m/z-> 5.0E6	1.055	m/z-> 2.0E5	1.0EG	2.0E6
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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.

Certified by:

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- * 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.
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- * 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 M5804 M5805

12/24

Solvent: 24002546

Nitric Acid

Lot #

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

CERTIFIED WEIGHT REPORT:

Part Number: Lot Number:

Description:

58120 122223

Calcium (Ca)

Expiration Date: 122226

2%

Nitric Acid

Formulated By:

Giovanni Esposito

122223

giovanne

Desert of

(III) 80.0

Nominal Concentration (µg/mL): **NIST Test Number: 6UTB** 10000

Recommended Storage:

Ambient (20 °C)

Weight shown below was diluted to (mL): 4000.0

Compound

쭚

Number Ĕ

Conc. (µg/mL)

3

Purity (%)

3

Nominal

5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Purity Uncertainty Assay

Weight (g) Target Actual

Actual

Uncertainty Expanded

Reviewed By:

Pedro L. Rentas

122223

ente

Weight (g) Canc. (µg/mL) +/- (µg/mL) CAS# (Solvent Safety Info. On Attached pg.)

OSHA PEL (TWA) LD50 OSHA PEL (TWA) **SDS Information** NIST SRM

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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.

Certified by:

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Certified Reference Material CRM

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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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(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.

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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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Physical Characterization:

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

Certified by:

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Part # 57048

2 of 2

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Certified Reference Material CRM

R: 03/01/23(12)



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

									-			
CENTIFIED WEIGHT REPORT:						Lot #)			
Part Number: Lot Number:		57058			Solven	t: 2111022	Solvent: 21110221 Nitric Acid		T	Errore Br		
Description:		Cerlum (Ce)	3							0	K	
Section 2		00000			2%		Nitric Acid	-	Formulated By	: Lawrence Barry	020623	Lon
Recommended Storage: Nominal Concentration (ug/mL):		020626 Ambient (20 °C) 1000	(Ç)			(JE)			1/2	to Herris	1	
NIST Test Number: 6UTB Weight shown below was diluted to (mL):	dilute	6UTB of to (mL):	1000.12	3E-05 E	5E-05 Balance Uncertainty 0.058 Flask Uncertainty		:		Reviewed By:	Pedro L. Rentas	29020	
		Ę		Purity 1	Nominal Purity Uncertainty Assay.	y Target	Actual	Actual	Expanded Uncertainty	SDS Information (Solvent Safety Info. On Attached pg.)	ation Attached pg.)	NIST
Compound	25. 25.		Number Conc. (ug/mL) (%) Purity (%) (%)	3	Purity (%) (%)		Weight (g)	Conc. (ug/mL)	Weight (g) Weight (g) Conc. (ug/ml.) +/- (ug/ml.) CAS#	CAS# OSHA PEL (TWA)	1D50	SRM

Compound	RM#	Lot	Nominal Conc. (vg/mL)	Purity (%)	Purity Uncertainty Assay (%) Purity (%) (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Actual Uncertainty Weight (g) Conc. (ug/mt.) +/- (ug/mt.)	Uncertainty +/- (ug/mL)	SS	(Solvent Safety Info. On Attached pg.) CAS# OSHA PEL (TWA) LD50	ched pg.) LD50	NIST
Cerium nitrate hexahydrate (Ce)	1N146	IN146 Z512CEB1	1000	99.989	0.10	32.8	3.04919	3.04921 1000.0	1000.0	20	II ==	₹Z	4 2	AN
[1] Spectrum N	lo.1 [43.472	sec]:58158.D#	[1] Spectrum No.1 [43.472 sec]:58158.D# [Count] [Linear]							Ш				$\ \cdot \ $
1.0€9_														
- 1.4 m) 1														
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w/2->	110	120	130	0	140		150	160	170		180	190 200		
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250

240

220

210

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Certified Reference Material CRM





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

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

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	<0.0>	9.0	<0.02	_	_	_	_
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	£	Te	E	E	Tm	Sn	Π
	40.2	<0.02	<0.02	40.2	<0.02	<0.02	<0.02
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/mL)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
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by ICP-MS	<0.02	<0.05	<0.02	<0.02	<0.02	<0.05	40.2
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Physical Characterization:

(T)= Target analyte

Certified by:

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



* 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

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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

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		180		(b) O		
		190		90		
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Part # 58024



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

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	==	Sn	Tm	3	ᄇ	급	176			
	40,02	40.02	40,02	40,02	<0.02	40,02	<0.02	Contract Contraction		
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	<0.02	< 0.02	<0.02	<0.02	40.02	40.02	<0.02	SALES OF SALES		

(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.

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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

M5697

Solvent:

Nitric Acid



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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

1. Copper(II) nitrate trihydrate (Cu) 58129 100223 0.1000 200.0 0.084 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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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

							Trace M	letals	Verifica	ition	by ICP-M	IS (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	Ть	<0.02	l 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	111	<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	l m l	<0.02	l 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	Y _b	<0.02
Be	<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	v	<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:

Bar 1. 8/1

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

* All standard containers are meticulously cleaned prior to use.

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

ırt # 58029

Lot # 102523

2 of 2

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^{*} 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).

^{*} 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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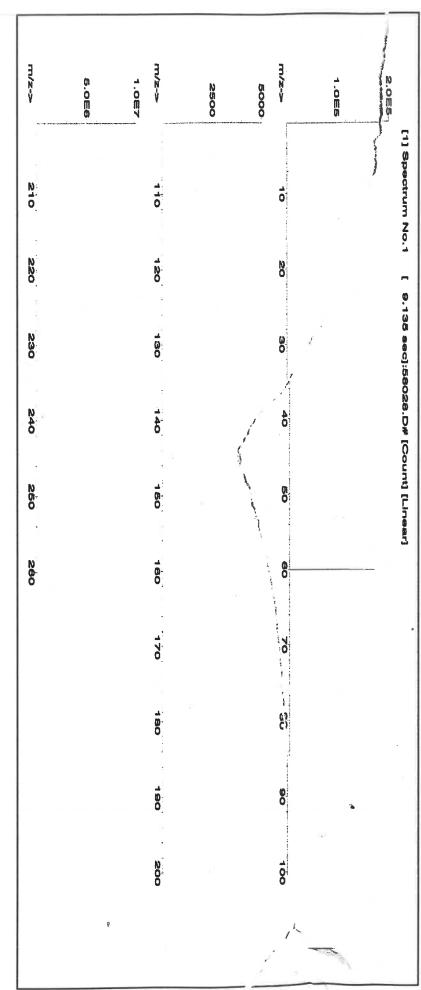


Certified Reference Material CRM

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CERTIFIED WEIGHT REPORT: Nickel(II) nitrate hexahydrate (Ni) Nominal Concentration (µg/mL): m/z-> 1.005 2.OES Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 ō 58128 Number Part **BTUB** 1000 57028 091223 Ambient (20 °C) 091226 Nickel (NI) 062023 ĕ 0 [9.135 sec]:58028.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor 12/20/23 000 Vol. (mL) Pipette (mL) Conc. (ug/mL) 200.0 0.058 5E-05 Balance Uncertainty Flask Uncertainty Uncertainty 0.084 24002546 M5748 Lot # Nominal 2.0% 8 Ci O Conc. (ug/ml.) Conc. (ug/ml.) Nitric Acid Solvent: 10000.4 E 40.0 0 Nitric Acid 1000.0 Formulated By: Reviewed By: +/- (µg/ml_ Uncertainty Expanded 12 (C) 13478-00-7 CAS# (Solvent Safety Info. On Attached pg.)

OSHA PEL (TWA) LD50 OSHA PEL (TWA) Pedro L. Rentas Lawrence Barry 00 SDS Information mg/m3 100 orl-rat 1620 mg/kg 091223 091223 3136 NEST NEST SR



Part # 57028

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

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		В	10	<u> </u>	Be	Ва	1	As	30	3	2				
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Physical Characterization:

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

Certified by:

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

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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

BTU₉

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:

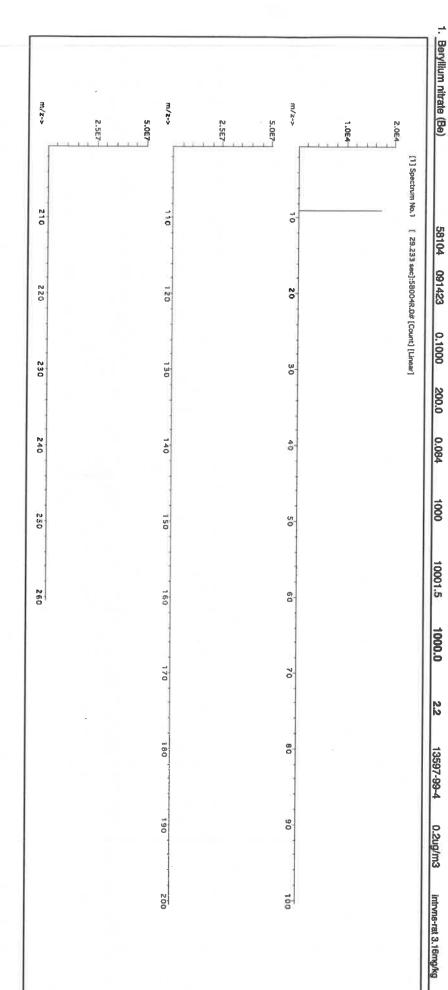
Pedro L. Rentas

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

₹



Part # 57004





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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

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

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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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	Z Z ≺ Z < ⊂ €	
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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.

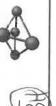
* All standard containers are meticulously cleaned prior to use.
* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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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)	်						N.	X			
Nominal Concentration (ug/ml.):		1000							Leens	1	4		
NIST Test Number:		eUTB		5E-05	Balance Uncertainty	\$			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 sec	34.243 sec]:58027.D# [Count] [Linear]	[Count] [Lit	Lagr						
5.0 Е5				70						
m/z-> 10 20		. 4	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	40.02	రే	40 7	占	<0.02	H9	<0.02	.3	₹005	Ź	₹0.02	2	<0.02	Š	40.02	T _e	40.05	5	40.02
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遥	40 .02	රි	۳	Ğ,	4002	ដ	<0.02	Mo	40.02	Æ	20'0 >	S	<0.02	S	40.02	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	₩	Fee Fee	40,02	Ħ	Ø.02	Z	Ø.02

(T)= Target analyte

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.



Lot # 091923

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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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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R	4444 444 444 444 444 444 444 444 444 4	g/mL)	
	Ta Sr Na Sc		
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	######################################		
(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:

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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 * 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).

Part # 57033

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M.5814

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071123

NIST SRM

071123

CERTIFIED WEIGHT REPORT: 1. Boric acid (B) Nominal Concentration (µg/mL): Recommended Storage: 17/Z-V <-Z/111 m/z-> Weight shown below was diluted to (mL): 2.5EG 5.0E6 2.5E6 S.OE6 1.0E4 2.0≡4 **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 1210 0 IN018 BV092016A1 RM# 57005 071123 1000 Ambient (20 °C) 071126 Boron (B) Number Ĕ 120 220 Ŋ [12.275 sec]:58105.D# [Count] [Linear] Conc. (µg/mL) 1999.48 Nominal 100 R - 02 00 124 130 230 30 0.058 Flask Uncertainty Purity 5E-05 Balance Uncertainty 8 Uncertainty Assay Purity (%) 0.10 140 240 40 Solvent: MKBQ8597V Ammonium hydroxide 17.3 2.0% 3 11.55772 Weight (g) 150 Target 250 (I) O 40.0 Weight (g) Ammonium hydroxide 11.56201 Actual 200 160 60 Conc. (µg/mL) 1000.4 Actual 170 70 Formulated By: +/- (µg/mL) Reviewed By: Uncertainty Expanded 120 180 10043-35-3 80 CAS# (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 Benson Chan Pedro L. Rentas OSHA PEL (TWA) tento **SDS Information** 190 90 2 mg/m3 200 100 orl-rat 2660 mg/kg 3107

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

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

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	00000000000000000000000000000000000000		
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Target analyte	X Y P Z Q Z Z	ation	
alyte	40.02 40.02 40.02 40.02 40.02	by ICP	
	Sen R.	-MS	
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	Z		
	4400 4400 4400 4400 4400 4400 4400 440		
		_	

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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 * 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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R1 02/09/124 Certified Reference Material CRM

M5816

CERTIFIED WEIGHT REPORT

Part Number:

Lot Number: Description:

57016 122923

Solvent:

122923

ASTM Type 1 Water

Lot #

Expiration Date: 122926 Sulfur (S)

Nominal Concentration (µg/mL): NIST Test Number: 1000

Recommended Storage:

Ambient (20 °C)

Weight shown below was diluted to (mL): 4000.0 5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

Reviewed By:

Pedro L. Rentas

122923

tento

Formulated By:

Benson Chan

122923

 Ammonium sulfate (S) IN117 SLBR7225V Number Conc. (µg/mL) 1000 99.9 38 Purity (%) 0.10 24.3 38 Weight (g) 16.4979 Weight (g) Conc. (µg/mL) 16.4980 1000.0 +/- (µg/mL) 20 7783-20-2 CAS# SDS Information
(Solvent Safety Info. On Attached pg.)
LD50 ¥ orl-rat 4250mg/kg 3181 SRM

1/Z-V m/z-> m/z-> N.SES S.OEB 5.OE7 1.0**E**8 N. SES 5.0E5 [1] Spectrum No. 1 210 110 0 120 ななり 0 [33.603 sec]:57016.D# [Count] [Linear] 130 230 30 140 240 40 250 150 000 160 200 00 170 0 180 80 190 00 200 100

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Part # 57016

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

(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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* 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: Lot Number: Description:

> 57015 091123

Solvent: 24002546 Lot # Nitric Acid

Nitric Acid

Formulated By:

Lawrence Barry

091123

(JE) 40.0

2%

Nominal Concentration (µg/mL):

NIST Test Number:

BITUB 1000 Recommended Storage:

Expiration Date:

091126

Phosphorous (P)

Ambient (20 °C)

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

Lot

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

SDS information

Reviewed By:

Pedro L. Rentas

rento

091123

 Ammonium dihydrogen phosphate (P) IN008 Pvos2018A1 [1] Spectrum No.1 RM# Number [12.074 sec]:58115.D# [Count] [Linear] Conc. (µg/mL) 1000 99.999 3 Purity (%) 0.10 27.5 3 Weight (g) 7.2729 Weight (g) Conc. (µg/mL) 7.2730 1000.0 +/- (µg/mL) 2.0 7722-76-1 CAS# (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 5 mg/m3 rl-rat >2000mg/ki 3186 SRM

000

100

1000

500

Part # 57015



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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	40.02	20.02	3	20.02	70.0>	3	<u></u>		A) (2)	20.02				

Physical Characterization:

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

Certified by:

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

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M5962 R! 06/14/24



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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	Zin Zin	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
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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 _L	<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:

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

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M5969 11/24

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CERTIFIED WEIGHT REPORT: Part Number:

57016 122923

Lot Number: Description:

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 1000

5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Recommended Storage:

Expiration Date:

122926 Ambient (20 °C)

Sulfur (S)

Weight shown below was diluted to (mL):

4000.0

ğ

Nominal

Purity

Uncertainty Assay

Target

Actual

Actual

Uncertainty Expanded Solvent:

122923

Lot #

ASTM Type 1 Water

Formulated By:

Benson Chan

122923

rento

Pedro L. Rentas

Reviewed By: 122923

SDS Information

1. Ammonium sulfate (S) IN117 SLBR7225V Number Conc. (µg/ml.) 1000 99.9 8 Purity (%) 0.10 24.3 8 Weight (g) 16.4979 Weight (g) Conc. (µg/mL) 16.4980 1000.0 +/- (µg/mL) 20 7783-20-2 CAS# (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 OSHA PEL (TWA) N orl-rat 4250mg/kg 3181 SRM

-Z/F 17/Z-> H/X-Y 1.0E8 2.5E5 2.5E8 5.0EB 5.0E7 5.0E5 [1] Spectrum No.1 110 210 0 120 220 N O [33.603 sec]:57016.D# [Count] [Linear] 130 00 230 140 240 40 150 1000 00 160 260 60 170 0 180 0 190 90 100 000

Part # 57016

CERTIFIED WEIGHT REPORT:
Part Number:
Lot Number: Lithium nitrate (Li) Nominal Concentration (µg/mL): m/z-> Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date** [1] Spectrum No.1 [32.093 sec]:58003.D# [Count] [Linear] Description: 210 10 Part Lot Number Number 58103 070622 0.1000 57003 062124 Lithium (Li) 6UTB 062127 Ambient (20 °C) 1000 220 120 20 250.11 230 25.0 0.004 Initial Uncertainty Nominal Initial Final

Vol. (mL) Pipette (ml.) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) 0.016 Flask Uncertainty 5E-05 Balance Uncertainty HEBSON OF PSON 240 40 1000 24002546 Lot# 2.0% 250 150 50 Nitric Acid Solvent: 10000.4 (mL) 260 1000.0 Nitric Acid 7/01/24 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Giovannie Capacito 2.0 7790-69-4 5 mg/m3 orl-rat 1426 mg/kg NA SDS Information
(Solvent Safety Info. On Attached pg.)
CAS# OSHA PEL (TWA) LD50 Pedro L. Rentas Giovanni Esposito 9 0 062124 062124 SRM

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

\$

Certified Reference Material CRM

20

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

Part # 57003 Lot # 062124

1 of 2

Printed: 6/24/2024, 11:20:08 PM

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Certified Reference Material CRM



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

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

40.02 40.01	40.2 40.02 40.01	40.2 40.02	40.2		<0.02	<0.02				
გ ბ	ζ		ొ	Ç	Ca	2				
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×	Pt	P	Pd	Ç	8	2	X.	ľ	tion b	١
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Ta	0	, Y	N	3v	2	2 5	S	۱		I
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E	1 1	3 1	1 :	1 :	3 5	3 :	7			I
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1	7 1	7,	< ?	\$.	< 0	=	W			
20.02	10.02	A 60	3 8	3 8	000	<0.02	<0.02			

(T) = Target analyte

Physical Characterization:

Al Sh As Ba Ba Bi

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

* All standards on prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

* Standards are prepared gravimetrically using balances that are calibrated.

* 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

* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

Part # 57003 Lot # 062124

Printed: 6/24/2024, 11:20:08 PM

2 of 2

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_{CRM/RM}, where one method of characterization is used is the mosn of individual results:

 $(x_0) \ (x_0) \ (x_0$

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, its reported below, solutions tested by ICP-MS were snakyzed in an III bA-Bitter of the properties of the propertie

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

> uR 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 i 84500.0 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 69Z000'0

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 n.	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 puspulses entre avon	•

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 HZO / 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° - 24° 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 biselfe 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° - 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



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

M5985 R:6/14/24

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:

CGIN10

Lot Number:

U2-IN729349

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Indium

Starting Material:

Indium Metal

Starting Material Lot#:

2511

Starting Material Purity:

99.9995%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:

 $10022 \pm 30 \mu g/mL$

Density:

1.044 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1

10021 ± 56 µg/mL

ICP Assay NIST SRM 3124a Lot Number: 110516

Assay Method #2

10035 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #3

10001 ± 33 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_{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_i = mean of Assay Method i with standard uncertainty uchar i

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

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

uts = transport stability standard uncertainty

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

Characterization of CRM/RM by One Method

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

u_{char 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)

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	<	0.000760	М	Eu	<	0.000760	0	Na		0.012771	M	Se	<	0.023000	М	Zn	<	0.006100
M	Al		0.003385	0	Fe		0.004462	М	Nb	<	0.000760	0	Si		0.024619	М	Zr	<	0.000760
М	As	<	0.004600	М	Ga	<	0.000760	М	Nd	<	0.000760	М	Sm	<	0.000760				
М	Au	<	0.002300	M	Gd	<	0.000760	0	Ni	<	0.005100	М	Sn	<	0.000760				
0	В		0.003692	M	Ge	<	0.001600	М	Os	<	0.000760	0	Sr	<	0.000610				
М	Ba	<	0.001600	M	Hf	<	0.000760	n	Р	<		М	Ta	<	0.000760				
0	Be	<	0.000130	M	Hg	<	0.003100	M	Pb		0.001400	М	Tb	<	0.000760				
M	Bi	<	0.000760	М	Ho	<	0.000760	М	Pd	<	0.001600	М	Te	<	0.000760				
0	Ca		0.004616	S	In	<		М	Pr	<	0.000760	М	Th	<	0.000760				
M	Cd	<	0.000760	М	lr	<	0.000760	M	Pt	<	0.000760	0	Π	<	0.001100				
M	Ce	<	0.000760	0	K		0.007078	М	Rb	<	0.000760	М	TI	<	0.000760				
M	Co	<	0.000760	М	La	<	0.000760	М	Re	<	0.000760	М	Tm	<	0.000760				
0	Cr	<	0.001300	0	Li	<	0.000130	М	Rh	<	0.000760	М	U	<	0.000760				
М	Cs	<	0.000760	M	Lu	<	0.000760	М	Ru	<	0.000760	М	V	<	0.001600				
М	Cu	<	0.003800	0	Mg		0.000707	n	S	<		М	W	<	0.001600				
М	Dy	<	0.000760	0	Mn		0.000149	M	Sb	<	0.000760	М	Υ	<	0.000760				
М	Er	<	0.000760	М	Мо	<	0.002300	М	Sc	<	0.000760	M	Yb	<	0.000760				

n - Not Checked For s - Solution Standard Element

M - Checked by ICP-MS O - Checked by ICP-OES

i - Spectral Interference

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 <u>Terms and Conditions of Sale.</u> 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° 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.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 114.82 +3 6 In(H2O)6+3 Chemical Compatibility -Soluble in HCl, HNO3, and H2SO4. Avoid neutral and basic media. Stable with most metals and inorganic anions. The oxalate, sulfide, carbonate, hydroxide and phosphate are insoluble in water.

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

In Containing Samples (Preparation and Solution) -Metal (Best dissolved in HCl / HNO3); Oxide (Soluble in mineral acids); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Sulfuric/peroxide digestion or 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 115 amu	1 ppt	n/a	115Sn, 99Ru16O
ICP-OES 158.583 nm	0.05 / 0.002 μg/mL	1	
ICP-OES 230.606 nm	0.1 / 0.03 μg/mL	1	Ni, Os
ICP-OES 325.609 nm	0.2 / 0.05 μg/mL	1	Mn, Mo, Th

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

February 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

- February 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

0 I TOT D 0	an Datas	
- Sealed TCT Bag Or	pen 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:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director 20178hi



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com R:2/22/24 M5-997

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: CLPP-CAL-3

Lot Number: T2-MEB727800

Matrix: 7% (v/v) HNO3

Value / Analyte(s): 1 000 μg/mL ea:

Arsenic, Lead,

Selenium, Thallium,

500 µg/mL ea: Cadmium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Arsenic, As	1 000 ± 7 µg/mL	Cadmium, Cd	500.0 ± 2.2 μg/mL
Lead, Pb	1 000 ± 4 µg/mL	Selenium, Se	1 000 ± 6 μg/mL

Thallium, ΤΙ 1 000 ± 7 μg/mL

Density: 1.042 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE As	METHOD ICP Assay	NIST SRM# 3103a	SRM LOT# 100818
As	Calculated		See Sec. 4.2
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_{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_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 (±) = $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$

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

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_{CRIMRM}, where one method of characterization is used is the mean of individual results:

XCRM/RM = (Xa) (uchar a)

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

uits = 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>

 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° 24° 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; inorganic

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

December 21, 2022

- 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

- December 21, 2027
- 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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12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control DD9784.

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

⁻ 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

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ACCREDITATION / REGISTRATION 1.0

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:

CHEM-CLP-4

Lot Number:

V2-MEB746172

Matrix:

3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s):

1 000 µg/mL ea:

Boron,

Molybdenum,

Silicon,

Tin,

Titanium

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

ANALYTE Boron, B

CERTIFIED VALUE

ANALYTE Molybdenum, Mo **CERTIFIED VALUE**

1 000 ± 5 µg/mL

Silicon, Si

1 000 ± 5 µg/mL 1 000 ± 7 µg/mL

Tin. Sn

1 000 ± 5 µg/ml.

Titanium, Ti

1 000 ± 6 μg/mL

Density:

1.032 g/mL (measured at 20 ± 4 °C)

Assav Information:

,			
ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-S1702546
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_{CRWRM}, 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 uchar i

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

utts = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

 $X_a = mean$ of Assay Method A with $u_{char} = the$ standard uncertainty of characterization Method A $CRM/RM = the standard uncertainty ($^{\pm}$) = U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{tts} + u^2_{ts}\right)^{\frac{1}{2}} \\ k = coverage factor = 2 \\ u_{char} = the errors from characterization \\ u_{bb} = bottle to bottle homogeneity standard uncertainty \\ u_{lts} = long term stability standard uncertainty (storage) \\ u_{tg} = transport stability standard uncertainty$

Characterization of CRM/RM by One Method

is used is the mean of individual results:

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

Certified Value, X_{CRM/RM}, where one method of characterization

- 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>

 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° 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
 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

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 12, 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 12, 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 F	ag 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.

Paul R Sains

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns Custom VS Manager

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

Certificate of Analysis

M6074

M6075 M6076 M6077

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EXP. 9/6/2029

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:

CHEM-CLP-4

Lot Number:

V2-MEB746762

Matrix:

3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s):

1 000 µg/mL ea:

Boron,

Molybdenum,

Silicon,

Tin,

Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Boron, B **CERTIFIED VALUE**

ANALYTE Molybdenum, Mo **CERTIFIED VALUE**

1 000 ± 5 μg/mL

Silicon, Si

1 000 ± 5 µg/mL

Tin, Sn

1 000 ± 5 µg/mL

Titanium, Ti

1 000 ± 7 μg/mL

1 000 I 5 pg/mL

1 000 ± 6 µg/mL

Density:

1.033 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-SI702546
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_{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_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:

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

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

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$ 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_{CRW/RM}, where one method of characterization is used is the mean of individual results:

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

uits = 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.

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

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° 24° 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

September 06, 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

- September 06, 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.

Paul R Sains

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns Custom VS Manager

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

Certificate of Analysis

M6074

M6075 M6076 M6077

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EXP. 9/6/2029

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:

CHEM-CLP-4

Lot Number:

V2-MEB746762

Matrix:

3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s):

1 000 µg/mL ea:

Boron,

Molybdenum,

Silicon,

Tin,

Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Boron, B **CERTIFIED VALUE**

ANALYTE Molybdenum, Mo **CERTIFIED VALUE**

1 000 ± 5 μg/mL

Silicon, Si

1 000 ± 5 µg/mL

Tin, Sn

1 000 ± 5 µg/mL

Titanium, Ti

1 000 ± 7 μg/mL

1 000 I 5 pg/mL

1 000 ± 6 µg/mL

Density:

1.033 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-SI702546
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_{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_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:

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

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

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$ 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_{CRW/RM}, where one method of characterization is used is the mean of individual results:

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

uits = 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.

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

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° 24° 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

September 06, 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

- September 06, 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.

Paul R Sains

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns Custom VS Manager

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

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
			•				NO.1
N N O		120			0		و
230		100			30		1.243
ō		Ō					ec]:57(
N 40		140			40		[34.243 sec]:57025.D# [Count] [Linear]
							Coun
N D		150			6		t] [Line
N O		300			0		2
J		•					
		170			70		
		-			Ó		
		0			80		
		90			0		
		N 0	on.		100		



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	40.02	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,	<0.02	ନୁ	40.02	F.	40.02	Mn	H	Pd	<0.02	&	40.02	Z	40,2	1	<0.02	충	< 0.02
Ве	40.01	ប៉	40.02	ဂ္ဘ	40.02	7,	40.2	Hg	<0.2	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	60.02
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:

Jon T. Mills

- * 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_{CRM/RM}, where two or more methods of characterization are used is the weighted mean of the results:

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

 $\mathbf{X_i}$ = mean of Assay Method \mathbf{i} with standard uncertainty \mathbf{u}_{char} \mathbf{i} \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 (±) = $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{bs})^{1/2}$

k = coverage factor = 2

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

ults = long term stability standard uncertainty (storage)

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:

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

X, = 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

uchar a = the errors from characterization

u_{bb} = 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.

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

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.

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

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>, 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° 24° 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

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 HCI 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 HCI / 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

- 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:

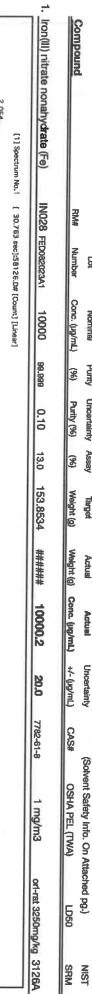
Paul Gaines Chairman / Senior Technical Director

Certified Reference Material CRM

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

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: 22% 24012496 40.0 Nitric Acid Nitric Acid Reviewed By: Formulated By: Expanded Pedro L. Rentas Benson Chan SDS Information 011025 011025



Q

Nominal

Purity

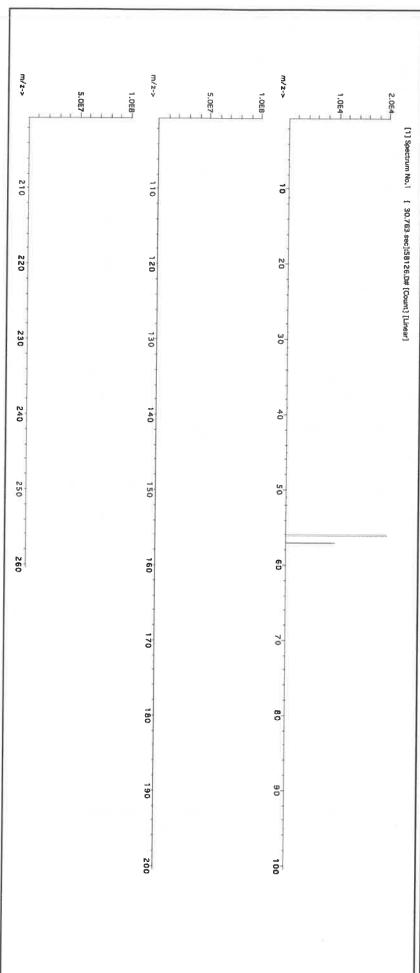
Uncertainty

Target

Actual

Actual

Uncertainty



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):

						11000 14	Cons	40111000			4	ļ:,						
1	2	3		A) (3)	3H	20.00		A) (72	z	<0.02	Pr	<0.02	Se	<0.2	4.	40.02	W	<0.02
	6	70.05	٧	20.02	11.3	9WW	100	40.00		10.00			?		1	3	11	3
	3 	40.0	Ęį.	A) (2)	Ho	40.02	E	40.02	Z	40.02	Re	∆ .02	S	<0.02	te e	20.02	C	20.02
_	-		1		•			5	?	3	D.	3	Δα.	3	1	40.07	∨	₽ 20.05
	င္ပ	40.02	Eu	20.02	la la	70.02	Stal	10.03	Ş	*U.U2	2	40.04	2 20	40.00				
A 20	ر ا	3	3	40.02	7	A 0.03	Mn	A0.02	Z	<0.02	Rb	40.02	Z	40.2	Th	<0.07Z	YD	20.02
_	. (1	1	:	5	9	3	0	3	ę	2000	7	A 02	4	A0.02
_	t	40.02	Ga	Z0.02	J. es	-	126	2.02	٦	20.02	Nu	40.00	Ş	10101			1	
	3	3	<u></u>	A) (1)	ds.	A0.02	Mo	40.02	P	40,02	Sm	<0.02	S	<0.02	Sa	40,02	20	20,02
_	a (000		3	7	3	Z.	3	κ.	3	S	A) 02	<u></u>	A 0.02	1	8000	Zr	40.02

(T)= Target analyte

Physical Characterization:

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

Certified by:

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 * 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.
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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



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

CERTIFIED WEIGHT REPORT: 1. Sodium nitrate (Na) Neminal Concentration (µg/mL): Recommended Storage: Weight shown below was diluted to (mL): m/z-> m/z-> M/X-Y NIST Test Number: 2.5E6 5.0E6 2.500 5.0E6 2.5E5 5.0E5 **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 210 110 IN036 NAV01201511 0 RM# **6UTB** 072427 58111 072424 10000 Ambient (20 °C) Sodium (Na) Number Lot 120 220 NO [8.935 sec]:58111.D# [Count] [Linear] Conc. (µg/mL) 10000 4000.2 Nominal M6144 R->1/13/2 Solvent: 130 30 99.999 5E-05 Balance Uncertainty Purity 0.10 Flask Uncertainty (96) Uncertainty Assay Purity (%) 0.10 240 140 4 26.9 8 2% 24002546 Nitric Acid 148.7096 Weight (g) Target (mL) 250 150 50 ###### Weight (g) Conc. (µg/mL) Nitric Acid Actual 160 260 0 10000.0 Actual 170 70 +/- (µg/mL) Uncertainty Reviewed By: Formulated By: Expanded 20.0 7631-99-4 180 80 CAS# (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Benson Chan OSHA PEL (TWA) **SDS** Information 180 90 5 mg/m3 200 100 orl-rat 3430 mg/kg 3152a 072424 072424 TSIN MES.

Printed: 1/10/2025, 4:48:22 PM

1 of 2

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

ĺ	B	<u>B</u>	Be	Ba	As	Sb	≥	9		
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(T) = Target analyte

Physical Characterization:

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

Certified by:

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

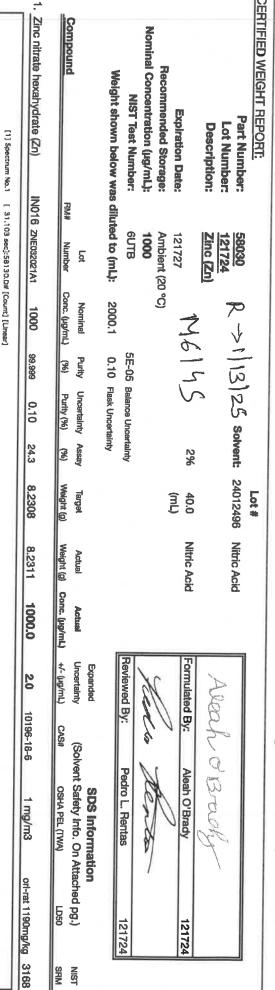
All Standards should be stored with caps tight and under appropriate laboratory conditions.

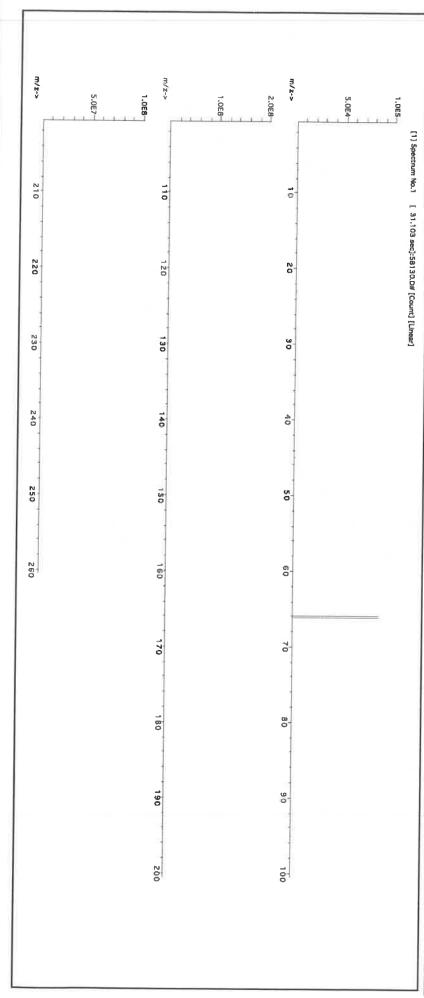
Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 58111

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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(T) = Target analyte

Physical Characterization:

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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 ₄)	≤ 0.5 ppm	< 0.5 ppm
Sulfate (SO ₄)	≤ 0.05 ppm	< 0.03 ppm
Sulfite (SO₃)	≤ 0.5 ppm	< 0.3 ppm
Ammonium (NH ₄)	≤ 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







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 (POa) Sulfate (SOa) Sulfate (SOa) Sulfate (SOa) Arsenic and Antimony (as As) Arsenic in and Antimony (as As) Arsenic and Antimony (as As) Arsenic and Antimony (as As) Arsenic and Interest Bairum (Ba) Arace Impurities - Beryllium (Ba) Arace Impurities - Beryllium (Ba) Arace Impurities - Boron (B) Arace Impurities - Cadmium (Cd) Arace Impurities - Cadmium (Cd) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Co) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Cu) Arace Impurities - Color (Cu) Arace Impurities - Color (Cu) Arace Impurities - Color (Au) Arace Impurities - Color (Au) Arace Impurities - Color (Au) Arace Impurities - Lead (Pb) Arace Impurities - Lithium (Li) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Ar	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 ₄) Sulfate (SO ₄) Sulfate (SO ₄) 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 – 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 – Colon (Fe) Trace Impurities – Lichium (Li) Trace Impurities – Lichium (Li) Expressible 10.0 ppb Trace Impurities – Manganese (Mn) Expressible 10.0 ppb Trace Impurities – Manganese (Mn) Expressible 10.0 ppb Ex	Residue after Ignition		5
Phosphate (PO ₄) ≤ 0.10 ppm < 0.03 ppm	Chloride (CI)		1 ppm
Sulfate (SO ₄) ≤ 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 ₄)		< 0.03 ppm
Trace Impurities - Aluminum (AI) ≤ 40.0 ppb < 1.0 ppb	Sulfate (SO ₄)	• •	< 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 substitute 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
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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)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Thallium (TI)		< 5.0 ppb
Trace Impurities - Tin (Sn)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Titanium (Ti)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Zirconium (Zr)	≤ 10.0 ppb	
Particle Count - 0.5 µm and greater	≤ 60 par/mi	< 1.0 ppb
Particle Count – 1.0 µm and greater		10 par/ml
_	≤ 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





M-6162

R. Date & 0412712025

Material No.: 9606-03 Batch No.: 24H0162012 Manufactured Date: 2024-06-28

Retest Date: 2029-06-27 Revision No.: 0

Certificate of Analysis

Assay (HNOs) Appearance Passes Test Passes Test Passes Test Color (APHA) Residue after Ignition S 2 ppm Chloride (Cl) Choloride (Cl) S 0.08 ppm 0.03 ppm 0.03 ppm Nosphate (PO₄) Sulfate (SO₄) Sulfate (SO₄) Arsenic and Antimony (as As) Trace Impurities - Beryllium (Be) Trace Impurities - Beryllium (Be) Trace Impurities - Beron (B) Trace Impurities - Beron (B) Trace Impurities - Calcium (Cd) Trace Impurities - Calcium (Cd) Trace Impurities - Calcium (Cd) Trace Impurities - Cobalt (Co) Trace Impurities - Cobalt (Co) Trace Impurities - Cobalt (Co) Trace Impurities - Coper (Cu) Trace Impurities - Gold (Au) Frace Impurities - Iron (Fe) Trace Impurities - Lead (Pb) Trace Impurities - Manganese (Mn) Trace Impurities - Manganese (Mn) S 20.0 ppb C 10.0 ppb C 1.0 ppb	Test	Specification	Result
Appearance Color (APHA)	Assay (HNO3)	69.0 - 70.0 %	69.7 %
Color (APHA) ≤ 10 5 Residue after Ignition ≤ 2 ppm < 1 ppm	Appearance		
Residue after Ignition ≤ 2 ppm < 1 ppm	Color (APHA)	≤ 10	
Chloride (Cl) ≤ 0.08 ppm 0.03 ppm Phosphate (PO4) ≤ 0.10 ppm < 0.03 ppm	Residue after Ignition	≤ 2 ppm	
Phosphate (PO₄) ≤ 0.10 ppm < 0.03 ppm	Chloride (CI)	≤ 0.08 ppm	
Sulfate (SO ₄) ≤ 0.2 ppm < 0.2 ppm	Phosphate (PO ₄)	≤ 0.10 ppm	• •
Trace Impurities - Aluminum (Al) ≤ 40.0 ppb < 1.0 ppb	Sulfate (SO ₄)	≤ 0.2 ppm	
Arsenic and Antimony (as As) \$\leq\$ 5.0 ppb	Trace Impurities - Aluminum (Al)	≤ 40.0 ppb	• •
Trace Impurities - Barium (Ba)	Arsenic and Antimony (as As)	≤ 5.0 ppb	
Trace Impurities – Beryllium (Be) Trace Impurities – Bismuth (Bi) Trace Impurities – Boron (B) Trace Impurities – Cadmium (Cd) Trace Impurities – Calcium (Ca) Trace Impurities – Calcium (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 – Gallium (Ga) Trace Impurities – Gold (Au) Heavy Metals (as Pb) Trace Impurities – Iron (Fe) Trace Impurities – Lead (Pb) Trace Impurities – Lead (Pb) Trace Impurities – Magnesium (Mg) Trace Impurities – Manganese (Mn) Trace Impurities – Mickel (Mi) ■ 20 ppb ■ 21.0 ppb ▼ 1.0 ppb	Trace Impurities - Barium (Ba)	≤ 10.0 ppb	• •
Trace Impurities – Bismuth (Bi) Frace Impurities – Boron (B) Frace Impurities – Cadmium (Cd) Frace Impurities – Cadmium (Cd) Frace Impurities – Calcium (Ca) Frace Impurities – Calcium (Ca) Frace Impurities – Chromium (Cr) Frace Impurities – Cobalt (Co) Frace Impurities – Cobalt (Co) Frace Impurities – Copper (Cu) Frace Impurities – Copper (Cu) Frace Impurities – Gallium (Ga) Frace Impurities – Gallium (Ga) Frace Impurities – Germanium (Ge) Frace Impurities – Gold (Au) Frace Impurities – Gold (Au) Frace Impurities – Iron (Fe) Frace Impurities – Iron (Fe) Frace Impurities – Lead (Pb) Frace Impurities – Lithium (Li) Frace Impurities – Magnesium (Mg) Frace Impurities – Magnesium (Mg) Frace Impurities – Magnesium (Mg) Frace Impurities – Micked (Mi) Frace Impurities – Micked (Mi)	Trace Impurities - Beryllium (Be)	≤ 10.0 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	Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	• •
Trace Impurities - Cadmium (Cd) ≤ 50 ppb 0.3 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 Trace Impurities - Gold (Au) ≤ 20 ppb < 100 ppb < 50 ppb Trace Impurities - Iron (Fe) ≤ 40.0 ppb < 1.0 ppb Trace Impurities - Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities - Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1.0 ppb Trace Impurities - Magnesee (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Boron (B)	≤ 10.0 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 Trace Impurities - Iron (Fe) ≤ 40.0 ppb < 1.0 ppb Trace Impurities - Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities - Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1.0 ppb	Trace Impurities - Cadmium (Cd)	≤ 50 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 Trace Impurities - Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities - Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities - Magnesium (Mg) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Calcium (Ca)		• •
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 Trace Impurities - Lead (Pb)	Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	
Trace Impurities - Copper (Cu) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Cobalt (Co)	≤ 10.0 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 Trace Impurities – Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities – Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities – Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities – Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities – Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Copper (Cu)	≤ 10.0 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 Trace Impurities – Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities – Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities – Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities – Magnese (Mn) ≤ 10.0 ppb < 1 ppb	Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	
Trace Impurities - Gold (Au) ≤ 20 ppb < 1 ppb	Trace Impurities - Germanium (Ge)	≤ 20 ppb	
Heavy Metals (as Pb) ≤ 100 ppb < 50 ppb Trace Impurities – Iron (Fe) ≤ 40.0 ppb < 1.0 ppb Trace Impurities – Lead (Pb) ≤ 20.0 ppb < 1.0 ppb Trace Impurities – Lithium (Li) ≤ 10.0 ppb < 1.0 ppb Trace Impurities – Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities – Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Gold (Au)	≤ 20 ppb	• •
Trace Impurities – Iron (Fe) ≤ 40.0 ppb < 1.0 ppb	Heavy Metals (as Pb)	≤ 100 ppb	
Trace Impurities – Lead (Pb) ≤ 20.0 ppb < 1.0 ppb	Trace Impurities - Iron (Fe)	≤ 40.0 ppb	
Trace Impurities – Lithium (Li) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Lead (Pb)	≤ 20.0 ppb	• • • • • • • • • • • • • • • • • • • •
Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1 ppb Trace Impurities - Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb Trace Impurities - Mickel (Ni)	Trace Impurities - Lithium (Li)	≤ 10.0 ppb	• •
Trace Impurities - Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities – Magnesium (Mg)	≤ 20 ppb	• •
Trace impurities Nickel (Ni)	Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	
	Trace 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	< i 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



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	ay iiiioiiiiatioii.			
	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_{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_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:

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

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

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_{char 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_{char a} = 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>, 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° 24° 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

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

⁻ 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 μ 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_{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_i = mean of Assay Method i with standard uncertainty u_{char i}

 \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_{CRM/RM}, where one method of characterization is used is the mean of individual results:

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

X_a = mean of Assay Method A with

u_{char 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

 $\mathbf{u}_{\mathbf{char}\;\mathbf{a}}$ = 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_{ts} = 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>, 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° 24° 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 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 I C I Dau Obell Dale.	

- 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 us/ral. see

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 μ g/mL Cadmium, Cd 250.1 \pm 1.1 μ g/mL Lead, Pb 500.0 \pm 2.3 μ g/mL Selenium, Se 500.0 \pm 3.2 μ g/mL

Thallium, TI 500.0 \pm 3.0 μ 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_{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_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:

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

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

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_{ts} = 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_{char a} = 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>, 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° 24° 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

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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

⁻ 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

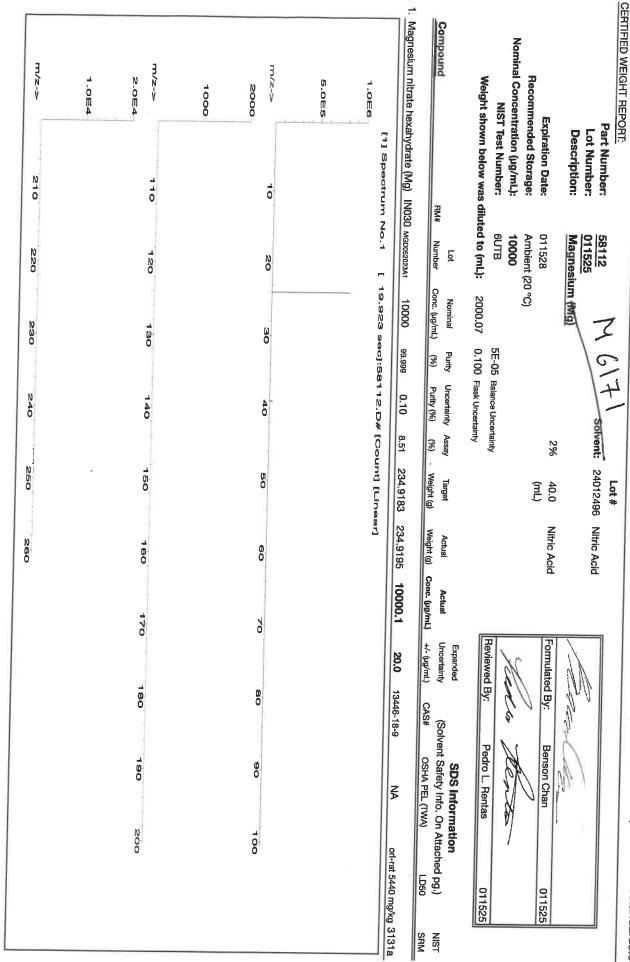
R->2015124

Certified Reference Material CRM

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



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





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	Verific:
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yte	\$\frac{\phi}{\phi}\$ CP-\$ \$\frac{\phi}{\phi}\$ 2
	Rh Rh Sm Sc
	9/mL) -0.02 -0.02 -0.02 -0.02 -0.02 -0.02
	Se Se Na Si S
	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).



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:

CLPP-CAL-1

Lot Number:

V2-MEB742428

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

5 000 µg/mL ea:

Calcium,

Potassium,

Magnesium,

Sodium,

2 000 µg/mL ea:

Aluminum,

Barium,

1 000 µg/mL ea:

Iron,

500 μg/mL ea:

Nickel,

Vanadium,

Zinc,

Cobalt,

Manganese,

250 µg/mL ea:

Silver,

Copper,

200 µg/mL ea: Chromium,

50 µg/mL ea:

Beryllium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 2 000 ± 7 µg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 2 000 ± 9 µg/mL
Beryllium, Be	50.03 ± 0.30 μg/mL	Calcium, Ca	5 000 ± 16 μg/mL
Chromium, Cr	200.0 ± 1.1 μg/mL	Cobalt, Co	500.0 ± 2.3 μg/mL
Copper, Cu	250.0 ± 1.1 μg/mL	Iron, Fe	1 000 ± 4 μg/mL
Magnesium, Mg	5 000 ± 22 μg/mL	Manganese, Mn	499.9 ± 2.2 μg/mL
Nickel, NI	500.1 ± 2.3 μg/mL	Potassium, K	5 000 ± 22 μg/mL
Silver, Ag	250.0 ± 1.1 μg/mL	Sodium, Na	5 000 ± 22 µg/mL
Vanadium, V	500.0 ± 2.2 μg/ml.	Zinc, Zn	500.0 ± 2.2 μg/mL

Density:

1.117 g/mL (measured at 20 ± 4 °C)

Assay Information:

ssay imormation:			
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
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_{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_i = mean of Assay Method i with standard uncertainty u_{char} i

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

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

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

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$ 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, $\mathbf{X}_{\text{CRM/RM}}$, 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

uchar a = the standard uncertainty of characterization Method A

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

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.

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

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° 24° 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

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 Laboratorles"

- 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; Info@inorganic ventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 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

- March 22, 2029
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date:		
This CDM/DM should not be used	 	

- 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

Mega Truong

Certificate Approved By:

Jodie Wall Stock VSM Coordinator

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director July Will
Paul R Laine



Certified Reference Material CRM

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

m/z->	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.	9 .		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
		Č		ð		14.495 aso]:68138.D# [Count] [Linear]	0.10 41.2	Uncertainty Assay Purity (%) (%)	0.100 Flask Uncertainty	5E-05 Balance Uncertainty	,	. 126 2%	2->8/6/ Solvent:
		ő		On C		unt] [Linea	4.85470	Target Weight (g)				40.0	24002546
		0		0		۵	1	Actual Weight (g)				Nitric Acid	Nitric Acid
		170		70			1000.0	Actual Conc. (µg/mL)					
							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	'	/	092724	

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

厐	В	Be	Ва	À	ds	A		
40,02	<0.02	10.0	40,02	80.2	40.02	<0.02		
C	C _C	ð	گ	රී	δ	Cd		
<0.02	<0.02	<0.02	40.02	40.02	40.2	<0.02		
Au	Ge	G	වූ	臣	면	Dy		
<0.02	<0.02	<0.02	<0.02	<0.02	40.02	<0.02		
Pb	La	Fe	Ħ	Ĭn	Но	ЭH		
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Nd	Mo	Нg	Mn	S _N	Ľ	Ľ	etais	
<0.02	40.02	40.2	<0.02	10.04	<0.02	<0.02	Verifica	1 0 u pro-
*	ጆ	סי	Pd	õ	ş	Z	ation	
40.2	40.02	40.02	△0.02	40.02	40.02	40.02	by ICP	-
Sc	Sm	Ru	Rb	Rh	Re	Pr	N.	
<0.02	<0.02	<0.02	△0.02	40.02	40.02	<0.02	μg/mL)	
Ta	S	Sr	Z	₩ Э	S	Se		
<0.02	<0.02	3	40.2	<0.02	<0.02	<0.2		
=	Sn	īn	H	⊒	Je	7		
<0.02	40.02	<0.02	<0.02	40.02	40.02	0.02		
77	Zn	~	5	<	¢	W		
40.02	40,02	40.02	<0.02	40.02	40.02	40.02		

(I) = larger analyre

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.

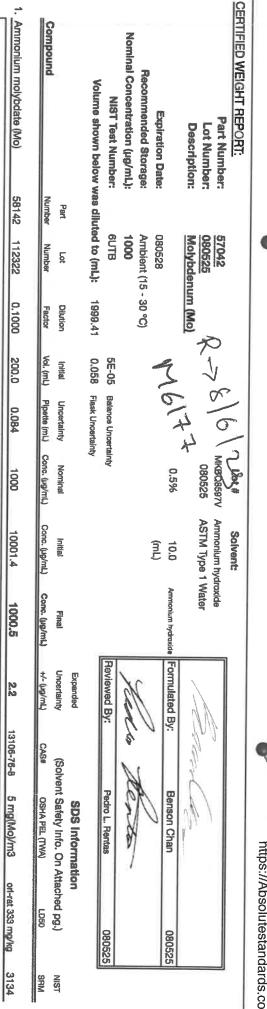
 * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Certified Reference Material CRM

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

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



m/z->	1.000	N.OMG	1000	2000	1.0 ms	N.OMO
010		110		10		
N N		พ. O		N		
N 0		9		30		Coom section (AR. De (Count) [Linear]
N A		140		4		i i
N O		100		91. O		ound India
N O		160		0		3
		170		70		
		190		0		
		100		90		
		N O		100		

Lot # 080525

Part # 57042

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

							Trace M	Metals	Verificat	ion by	ICP-MS	(µg/1	(ImL)						
						l											3	100	0.03
≥	<0.02	ဂ္ဂ	<0.02	Ş	<0.02	Ŧ	<0.02	_	<0.02	Z	<0.02	Pr	<0.02	Se	<0.2	귱	<0.02	8	<0.02
22	AO.02	Ω m	40.2	φ,	A0.02	귱	<0.02	Ε	<0.02	Z G	<0.02	J.	A0.02	ω	<0.02	œ ^t	<0.02	_	<0.02
À	^ o iv	ဂ္ဂ	A0.02	m E	<0.02	3	<0,02	<u>Z</u>	<0.01	ô	<0,02	곡	^0.02	ð	<0.02	∄	<0.02	<	<0.02
D	<0.02	င္ဆ	<0.02	ဓ	A0.02	<u>-</u>	<0.02	ş	<0.02	bd	<0.02	공	^ 0.02	2	♦ 0,≥	∄	<0.02	중	<0.02
EI P	40.01	<u>ဂ</u>	^O.O2	စ္အ	^ 0.02	Ti O	40.2	I.	^0.2	ס	△0.02	2	<0.02	Š	<0.02	₹	<0.02	~	<0.02
U	<0.02	ဂ္ဂ	<0.02	9	^0.02	5	^0.02	N _o	-1	Ŗ	<0.02	Sm.	♦ 0.02	ഗ	∆0.02	Sn	<0.02	5	<0.02
0)	△0.02	5	\$0.02 20.02	2	A 0.02	Po	A,02	Nd.	<0.02	~	<0.2	Sc	<0.02	Tie C	<0.02	7	<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 the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- Standards are prepared gravimetrically using balances that are calibrated by an ISO17025 certified organization with weights traceable through NIST to the SI kilogram (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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1.0 000	7.0EG	O. O. M. 4	1.065	5.OM 4	1.025	1. Lead(II) nitrate (Pb)	Compound	Expiration Date: 031528 Recommended Storage: Ambient (20 Nominal Concentration (µg/mL): 1000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	CERTIFIED WEIGHT REPORT: Part N Lot N Desc
	110		Ö		[1] Spectrum No.1	INO	RM#	Expiration Date: nended Storage: ntration (µg/mL): ST Test Number: shown below was di	PORT: Part Number: Lot Number: Description:
í j	n O		N)		Z 0.1	IN029 PBD122016A1	Lot Number	031528 Ambient (2 1000 6UTB	57082 031525 Lead (Pb)
	4 0		ය 0			1000	Nominal Conc. (µg/mL)	2000.07	868
	ō		0		90]:080	99.999	Purity (%)	5E-05 Ba	6/2
	140		0		92. D*	0.10 6	Uncertainty Assay Purity (%) (%)	5E-05 Balance Uncertainty 0.10 Flask Uncertainty	Solvent:
	160		Ø.		14.144 sec]:58082.D# [Count] [Linear]	62.5 3.20015	vasay Target (%) Weight (g)	rty (mL)	Lot # ent: 24014457 2% 40.0
i d	160		90		7002	5 3.20067	Actual Weight (g)		Nitric Acid
	170		70			1000.2	Actual Conc. (µg/mL)		ā ā
	o					2.0	Expanded Uncertainty +/- (ug/mL)	Reviewed By:	Hievar Formulated By:
	6		a . O			10099-74-8	CAS#	By A	iovanne
	190		9			0.05 mg/m3	SDS Information (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) LE	Pedro L. Rentas	Siovanni Esposito
	200		100			intrvns-rat 93 mg/kg	nation In Attached pg.) A) LD50	031525	to 031525

www.absolutestandards.com

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

								lyte	et analyte	(T) = Target									
₹0.02	Zr	40,02	Ħ	<0.02	Ta	<0.02	Sc	40.2	*	<0.02	Nd		Po	<0.02	Au	<0.02	රි	<0.02	œ
<0.02	Zn	<0.02	Sn	<0.02	S	<0.02	Sm	<0.02	72	△0.02	Mo	<0.02	5	<0.02	ဂ္ဂ	<0.02	င္ပ	<0.02	B
40.02	4	40.02	T m	<0.02	St	<0.02	Ru	<0.02	Þ	40.2	五	40.2	ह	<0.02	ଜୁ	40.02	Ş	<0.01	Ве
♦0.02	4,4	<0.02	Ħ	40.2	Z	<0.02	Rb	40.02	Ьď	<0.02	M	<0.02	=	<0.02	ପୂ	40.02	ర్ల	60.02	Ва
<0.02	<	<0.02	H	<0.02	Age	<0.02	Rh	40.02	õ	<0.01	X _g	<0.02	5	<0.02	펄	<0.02	ဂ္ဂ	40.2	As
<0.02	C	<0.02	To	<0.02	Si	<0.02	Re	<0.02	R	<0.02	٤	<0.02	Ho	<0.02	耳	0.2	Ω	<0.02	Зb
<0.02	*	<0.02	T'b	<0.2	Se	<0.02	Ŧ	<0.02	Z	<0.02	Ξ	<0.02	Ж	<0.02	Dy	<0.02	ß	<0.02	A
									I		l								
						ug/mL)	VIS (by ICP-I	tion	Verifica	tals	Trace Me							
															I		I		1

Physical Characterization:

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

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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

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:

CGY10

Lot Number:

V2-Y740548

Matrix:

2% (v/v) HNO3

Value / Analyte(s):

10 000 µg/mL ea:

Yttrium

Starting Material:

Yttrium Oxide

Starting Material Lot#:

2661 and 06230520YL

Starting Material Purity:

99.9984%

CERTIFIED VALUES AND UNCERTAINTIES 3.0

Certifled Value:

 $10000 \pm 30 \mu g/mL$

Density:

1.032 g/mL (measured at 20 \pm 4 °C)

Assay Information:

Assay Method #1

10011 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #2

9997 ± 50 µg/mL

ICP Assay NIST SRM 3167a Lot Number: 190730

Assay Method #3

9984 ± 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_{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_i = mean of Assay Method i with standard uncertainty u_{char} i

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

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/4}$ where u_{char} i are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty 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.

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:

ucher a = the standard uncertainty of characterization Method A

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

X_a = mean of Assay Method A with

u_{bb} = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

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

uchar a = the errors from characterization

uts = transport stability standard uncertainty

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.

M	Ag	<	0.004600	М	Eu		0.009037	M	Na		0.086360	М	Se	<	0.005200	М	Zn		0.030125
М	ΑI		0.014862	0	Fe		0.002410	М	Nb	<	0.000570	0	Si		0.024100	0	Zr	<	0.002600
М	As	<	0.003500	М	Ga	<	0.000570	M	Nd		0.000923	M	Sm		0.000461				
М	Au	<	0.001700	M	Gd	<	0.003500	M	Ni	<	0.005700	М	Sn	<	0.002300				
0	В		0.002209	M	Ge	<	0.005200	М	Os	<	0.001200	M	Sr	<	0.004600				
0	Ba	<	0.002500	M	Hf	<	0.000570	n	Р	<		М	Ta	<	0.000570				
0	Ве	<	0.001400	M	Hg	<	0.000570	M	Pb		0.005020	М	Tb		0.001044				
M	Bi	<	0.003500	М	Но		0.009037	М	Pd	<	0.005100	М	Te	<	0.002300				
0	Ca		0.009841	М	in	<	0.002300	M	Pr	<	0.002300	М	Th	<	0.000570				
M	Cd	<	0.000570	М	lr	<	0.000570	М	Pt	<	0.000570	М	Ti	<	0.003500				
M	Ce	<	0.002300	0	K		0.018677	М	Rb	<	0.000570	М	TI	<	0.000570				
М	Co	<	0.000570	М	La		0.000461	M	Re	<	0.000570	M	Tm	<	0.003500				
M	Cr	<	0.004000	0	Li	<	0.009300	M	Rh	<	0.008000	М	U	<	0.000570				
М	Cs	<	0.000570	M	Lu		0.000582	М	Ru	<	0.000570	M	V		0.001265				
М	Cu		0.002610	0	Mg		0.001486	n	S	<		М	W	<	0.002300				
M	Dy		0.003815	М	Mn		0.000582	M	Sb		0.005422	s	Υ	<					
M	Er		0.003615	М	Мо	<	0.005700	M	Sc	<	0.001200	М	Yb		0.001827				

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>

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° 24° 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 - 88.91 +3 6 Y(OH)(H2O)x+2 Chemical Compatibility -Soluble in HCl, H2SO4 and HNO3. Avoid HF, H3PO4 and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride.

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

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

Y Containing Samples (Preparation and Solution) - Metal (Soluble in acids); Oxide (Dissolve by heating in H2O/ HNO3); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H2O / HCl or HNO3).

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 89 amu	0.8 ppt	N/A	73Ge16O, 178Hf+2
ICP-OES 360.073 nm	0.005 / 0.000036 µg/mL	1	Ce, Th
ICP-OES 371.030 nm	0.004 / 0.00007 μg/mL	1	Ce
ICP-OES 377.433 nm	0.005 / 0.0009 μg/mL	1	Ta, Th

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.685.3030, Fax: 540.585.3012; Inorganicventures.com; info@inorganicventures.com

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

11.1 Certification Issue Date

February 20, 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 20, 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

- 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 Man
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 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, Ai	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
Be	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
Се	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
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric	0404	See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn Na	EDTA	928	928
Na	ICP Assay Gravimetric	3152a	200413
Ni Ni	ICP Assay	3136	See Sec. 4.2
Ni	EDTA	928	120619 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	EDTA	928	928
Sr	ICP Assay	Traceable to 3153a	K2-SR650985
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_{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_i = mean of Assay Method i with standard uncertainty uchar i

w_i = 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_{its} = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

X_a = 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_{CRM/RM}, 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_{CRM/RM} = (X_a) (u_{char a})

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° 25° 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

- Sealed TCT Bag Open Date:	

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

⁻ 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:

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
Ті	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_{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_i = mean of Assay Method I with standard uncertainty u_{char I}

 $\mathbf{w_i}$ = 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_{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_{CRM/RM}, where one method of characterization is used is the mean of individual results:

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

X_a = 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, 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° 24° 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

Paul R Laine

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

⁻ 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.



Instructions for QATS Reference Material: ICP-AES ICS

QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (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

M6182

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of 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-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

<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

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,

Page 1 of 2











APTIM

Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES 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:

ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, 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 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES 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.	'CERTIFIE			FERENCE CI IXED WITH I	HECK SAMPL CSB-0710	E ICP-AES I	CSA-1211
Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ва	200	(6.0)	-194	206	(537)	337	737
Ве	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Co	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
TI	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value \pm 1 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.



Instructions for QATS Reference Material: ICP-AES ICS

QATS LABORATORY INORGANIC REFERENCE MATERIAL INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (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 M6184

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of 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-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

CAUTION: 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

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,

Page 1 of 2











APTIM

Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES 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:

ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, 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 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES 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.	"CERTIFIE			FERENCE CI	HECK SAMPL CSB-0710	E ICP-AES I	CSA-1211,
Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ва	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Co	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
Ti	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value \pm 1 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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M6027

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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	1000.0 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		1		[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]
N		: 				58028
240		6		4		.b# [0
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		170		8		
		80		80		
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		190		90		
		200		100		
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Part # 57028



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

	6	<u> </u>	Be	Ба	As	8	2			
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	3	<u> </u>	क्र	F	Б	Ж	Hf			
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= E	40.02	40.02	40.2	∆0.02	10.0	0.02	40.02		Verifica	
	5	7	~	Pd	õ	R	Z		tion	
Target analyte	⊕ 2	40.02	40,02	0.02	40.02	40,02	н		by ICP-N	
	જ	Sm	20	Rb	Rh	Re	꾸	DESCRIPTION OF THE PERSON OF T	S (h	
	40.02	₫002	40.02	40.02	40.02	40.02	<0.02		I/mL)	
	Ta	S	Ş	Na	Ag	83	Se			
	<0.02	40,02	40,02	402	40.02	40.02	40.2			
	=	Sn	Ħ	Ħ	∄	Te	4T			
	40.02	40.02	40.02	∆ 0,02	40.02	40.02	<0.02			
	27	Zn	×	¥	۷	a a	₩			
	40.02	∆ 0.02	A).02	40.02	<u>A</u>	∆ 0.02	△ 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).

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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

 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



							race Me	letals	Verificat	tion	by ICP-I	S	ug/mL)						
	The state of the s						A STATE OF STATE	, j											
A	<0.02	Ω	<0.02	Dy	<0.02	出	<0.02	Ľ	<0.02	Z	<0.02	7	<0.02	Se	<0.2	4	40.02	W	<0.02
4S	40.02	ဂ္ဂ	40.2	덬	40.02	Ж	40.02	Li	<0.02	3	40.02	₽ Re	4 0.02	S:	40.02	ď	A).02	a	\$0.02
As	40.2	Ç	<0.02	땹	<0.02	In	<0.02	Mg	<0.01	တ္တ	40.02	짜	<0.02	Agr	7	∄	<0.02	<	40.02
Ва	<0.02	రి	40,02	82	<0.02	듁	40.02	Mn	<0.02	Pd	<0.02	R.	40.02	N	40.2	∄	<u>\$</u>	상	<0.02
Ве	40.01	Ω	<0.02	හු	<0.02	ਲੋਂ	40.2	Hg	40.2	Þ	40.02	R	A0.02	Ž,	40,02	ď	♦ 0.02	<	40.02
쯨	<0.02	င္ပ	40.02	ନ	<0.02	5	<0.02	Mo	<0.02	77	40.02	Sin	△ 0.02	c/a	40.02	S	A) (2)	7,	40.07
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Physical Characterization:

(T)= Target analyte

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

Certified by:

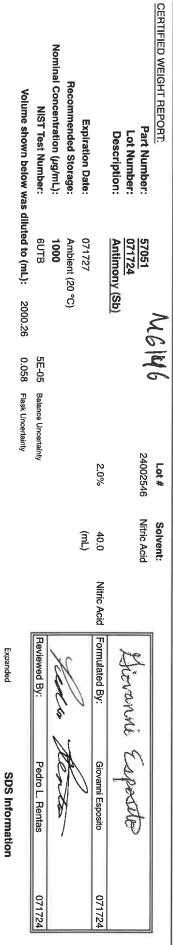
- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
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- 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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R:10/18/24 Certified Reference Material CRM

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Compound

Number Part

Number Ę

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL) Uncertainty

CAS#

OSHA PEL (TWA)

LD50

NIST SRM

(Solvent Safety Info. On Attached pg.)

Dilution Factor

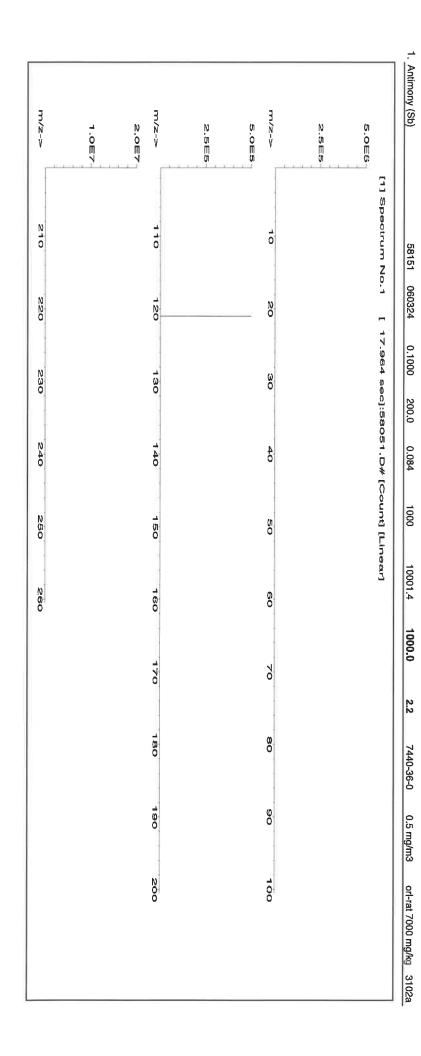
Initial

Uncertainty

Nominal

Initial

Final



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

	l				Н			Trace M	etals	Verifica		by ICP-M	3 <i>t</i> t) S	J/mL)						
1																				
	<u>A</u>	<0.02	δ	<0.02	Dy	<0.02	Hf	<0.02	Ľ	<0.02	Z	<0.02	7	<0.02	Se	<0.2	Тb	<0.02	W	<0.02
	Sb	Т	೧	<0.2	ቪ	<0.02	Но	<0.02	Ľ	< 0.02	7	<0.02	Re	<0.02	Si	40.02	Te	<0.02	u	<0.02
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	Ba	<0.02	ß	<0.02	8	<0.02	lr	<0.02	Mn	<0.02	Pd	<0.02	RЬ	<0.02	Na	40.2	∄	<0.02	ΥЪ	<0.02
	Be	<0.01	단	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	×	<0.02
	Bi	<0.02	င	<0.02	ဝူ	<0.02	La	<0.02	Мо	<0.02	ጉ	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
	В	<0.02	υ	<0.02	Au	<0.02	Pb	<0.02	M	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	11	<0.02	Zr	<0.02
										(T) – Target analyte	et analy	ďρ								

(I) = larget analyte

Physical Characterization:

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

Certified by:

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		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/m	5.0E5	1.0E6	m/z->	5000	1.0€4	1.0E6	2.OE6	
N			-1				El opegrum No.	
210			10		ö		3	
220			120		N O			
							4 0	
230			130		9		[]4.044 sec]:57081.D# [Count] [Linear]	
240			<u> </u>		4		57081.	
ō			140		40		<u> </u>	
250			1		OI.			
N			160		60			
			4		70			
			170		0			
			180		80			1000
			190		90			or any
			200		100			
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								0

Part # 57081



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

		œ	Id	: !	H.	52	į	As	30	2	2				
		40.02	20.02	5 8	200	20.02	e i	<u>۵</u>	20.02	3	40.02				
	ŀ	5	S	, (,	C	, {	3	Ç	>	5				
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et anal	F	4 ;	P	70	· ¦	2	ç	,	Z	142	Z			₹. 2	
yte	2.05	0.01	3	<0.02	1000	<0.02	<0.02		∆ 0.02	20.00	3		200	200	
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	Ta	ç	n	Ş	TAG	Z	Ag	5	2	č					
	40,02	20.02	3	∆.02	7.07	3	A).02	40.04	3	46					
	11	DC	?	ď	120	7	Ħ	č	ş-1	10					ı
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	Zr	120	1	×	ID	ş	<	0	1	\$					
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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.

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* 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

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#	+/- (ug/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->	2,588	5.0E8	1.007	m/z->	1.000	2.006
0 10		110		ō		
220		200		22.0		
230		130		90		
240		140		<u>A</u> .		
250		50		5		2
260		160		60		
		170		8		
		TEC		90		
		190		90		
		200		100		

Part # 57023

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

	E	В	Ве	Ва	As	. 20	2 2			
	40,02	A),02	40.01	A).03	40.2	20.02	8 6 5	A PA		
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	Au	ဂ္ဂ	స్ట	8	멸	耳	کِ ر			
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	3	<u>.</u>	737	5	rī.	Но	H			
	40.02	40.02	40,2	0.02	40.02	∆ 0.02	40.02	INTERNATION OF THE PERSON NAMED IN	Trace M	
	폽	Mo	He	Mn	Mg	댭	Σ		etals	
(T) = Target analyte	40.02	40.02	402	40,02	10.0	40.02	40.02		Verifica	
et analy	~	₽	ס	2	ဝ္ဂ	7	3	NAME AND ADDRESS OF	tion	
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	Sc	Sm	7	공 -	₽	Re	7		SI) SI	
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	ng (so s	?	Z,	Ag	ī.	Se.			
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	27	7,	< 5	\$.	< 1	q	¥	SALES HERSON		
	6.65 6.65 6.65 6.65 6.65 6.65 6.65 6.65	2 5	3 6	3 ·	-) {	A 22	∆ 0.02	STATE OF THE PARTY		

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.
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- * 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

A 112	D	Misses Issues
Aillance	Project	: Number:

Q2845 Q2846

				CHAIN OF COST	אזטכ	ECUR	U			COC	Nu	mbei	r:							
	CLIENT IN	FORMATIO	N	PRO	DJECT	INFO	RMATIC	N		BILLING INFORMATION										
COMPANY: Tully Er	nvironmental Inc.			PROJECT NAME: Trai	nsfer Sta	ation SF	DES			BILL .	TO: Sa	me						PO#		
ADDRESS: 57 Seav	view Blvd			PROJECT #: 252113			LOCATIO	N:		ADDF	RESS:									
CITY: Pt Washingto	on S	STATE: NY.	ZIP: 11050	PROJECT MANAGER						CITY: STATE: ZIP:										
ATTENTION: Dean	n Devoe			E-MAIL:						ATTENTION: PHONE:										
PHONE: 718 446 700	00 F	AX:		PHONE:			FAX:						AN	ALY	SIS					
DATA	TURNAROU	ND INFOR	MATION	DATA DE	LIVER	ABLE	INFOR	MATION		١.										
HARD COPY: EDD * TO BE APPROVE	ED BY ALLIANC	E	DAYS* DAYS*	* RESULTS ONLY RESULTS + QC New Jersey REDUCT New Jersey CLP	CED	O N	SEPA CLP ew York St ew York Sta ther	ate ASP "B ate ASP "A		- Hg 1631 LL	™ TSS/ 0&G	∾ Cu, Fe, PB	₽ BTEX	5	6	7	8	9		
STANDARD TURN	NAROUND TIME	IS 10 BUSIN	IESS DAYS	□ EDD Format									RESE	_					COMMENTS	3
						IPLE		IPLE	9			·							< Specify Present	
CHEMTECH SAMPLE ID	SAN	PROJEC IPLE IDENTII		SAMPLE MATRIX	COMP	GRAB GRAB	DATE	TIME	# of Bottles	1	2	3	4	5	6	7	8	9	A-HCI B-HN C-H2SO4 D-Na E-ICE F-Oti	ОН
	001 Willets	Pt Blvd (Ju	lv)	W	Ü	X	8/12/25		7	х	x	X	Х	Ť	Ť	Ė		Ť	2102 7 01	101
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RELINQUISHED BY 1. D Devoe RELINQUISHED BY	, 1	DATE/TIME Au 2, 2025 DATE/TIME	g RECEIVED BY 1. RECEIVED BY	DA 8-13-	Condi MeOH Comm	extrac	of bottles of	or coolers es an addit	s at rece tional 4o	ipt: z. Jar f	☐ (or per	Compl cent s	iant olid	□ No	on Con	npliant	: 0	Coole	er Temp_16 . 7 e in Cooler?:	
z. RELINQUISHED BY 3.	Y [DATE/TIME	2. RECEIVED FOR L 3.	AB BY	_	age	of	 DW - ALI IA		ANCE:	(Picke	ed Up		3 Over	_			Shipment Comp	lete I NO



Laboratory Certification

Certified By	License No.
CAS EPA CLP Contract	68HERH20D0011
Connecticut	PH-0830
DOD ELAP (ANAB)	L2219
Maine	2024021
Maryland	296
New Hampshire	255424 Rev 1
New Jersey	20012
New York	11376
Pennsylvania	68-00548
Soil Permit	525-24-234-08441
Texas	T104704488

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: Q2845

TULL01

Order Date: 8/13/2025 11:47:00 AM

Project Mgr:

Client Name: Tully Environmental, Inc.

Project Name: Transfer Station-SPDES

Report Type: Results Only

Client Contact: Dean Devoe

Invoice Contact: Dean Devoe

Receive DateTime: 8/13/2025 11:20:00 AM

EDD Type: EXCEL NOCLEANUP

Invoice Name: Tully Environmental, Inc

Purchase Order:

Hard Copy Date:

Date Signoff:

LAB ID	CLIENT ID	MATRIX SAMPLE DATE	SAMPLE TIME	TEST	TEST GROUP	METHOD		FAX DATE	DUE
Q2845-01	001 willets Pt Blvd(july)	Water 08/12/202	5 11:30						DATES
Q2845-04	002 35th Ave (july)	Water 08/12/2025	11:30	VOC-BTEX		624.1	2 Bus. Days		. /
				VOC-BTEX		624.1	B us. Days	< 21	

Relinguished By:

- 12:30 Mg 45

Storage Area: VOA Refridgerator Room