

Prep Standard - Chemical Standard Summary

Order ID : P2809

Test : Metals CLP Full

Prepbatch ID : PB161654,

Sequence ID/Qc Batch ID: LB131424,LB131438,LB131456,

Standard ID :

MP80924, MP80925, MP80926, MP80927, MP80928, MP80931, MP80932, MP80933, MP80934, MP80935, MP80942, MP80944, MP81024, MP81025, MP81026, MP81028, MP81119, MP81208, MP81209,

Chemical ID :

M4877,M4881,M4883,M4885,M4888,M4889,M4960,M4961,M5130,M5192,M5200,M5223,M5224,M5227,M5272,M5288,M5 289,M5294,M5296,M5298,M5387,M5389,M5395,M5429,M5468,M5473,M5494,M5497,M5498,M5513,M5632,M5658,M5697 ,M5698,M5747,M5754,M5769,M5798,M5799,M5800,M5801,M5815,M5817,M5818,M5819,M5875,M5895,M5915,M5929,M5 935,M5936,W2606,



Recipe ID 902	NAME ICP AES CAL BLK (SO/ICB/CCB)	<u>NO.</u> MP80924	Prep Date 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> None	Supervised By Mohan Bera 06/11/2024
<u>FROM</u>	125.00000ml of M5895 + 2350.0000	Dml of W260	06 + 25.00000	ml of M5915 =	Final Quantity:	2500.000 ml		

<u>Recipe</u> <u>ID</u> 1004	NAME ICPAES ISM01.2 (S5)	<u>NO.</u> MP80925	<u>Prep Date</u> 05/30/2024	Expiration Date 06/30/2024	<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	PipetteID METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/11/2024
FROM	0.25000ml of M5798 + 0.50000ml of 12.50000ml of M5200 + 12.50000ml 14.50000ml of M5289 + 14.50000ml 22.50000ml of M5769 + 5.00000ml o 5.00000ml of M5875 + 318.50000ml	of M5288 + of M5298 + f M5272 + 5	12.50000ml c 14.50000ml c .00000ml of N	of M5698 + 12.5 of M5658 + 2.00 M5296 + 5.0000	50000ml of M58 0000ml of M551 00ml of M5395 +	19 + 13.75000r 3 + 22.50000m	nl of M5697 + I of M5498 +	



Recipe ID 1005	NAME ICPAES ISM01.2(S4)	<u>NO.</u> MP80926	Prep Date 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/11/2024
<u>FROM</u>	50.00000ml of MP80924 + 50.00000	ml of MP809	925 = Final Q	uantity: 100.00	1 I I I I I I I I I I I I I I I I I I I			

NAME	<u>NO.</u>			<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u> Mohan Bera
ICPAES ISM01.2(S3)	<u>MP80927</u>	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE TTE_3 (A)	06/11/2024
25.00000ml of MP80925 + 75.00000	ml of MP80	924 = Final Q	uantity: 100.00	10 ml			
	ICPAES ISM01.2(S3)	ICPAES ISM01.2(S3) <u>MP80927</u>	ICPAES ISM01.2(S3) MP80927 05/30/2024	NAME NO. Prep Date Date ICPAES ISM01.2(S3) MP80927 05/30/2024 06/30/2024	NAME NO. Prep Date Date By	NAMENO.Prep DateDateByScaleIDICPAES ISM01.2(S3)MP8092705/30/202406/30/2024Sarabjit JaswalNone	NAMENO.Prep DateDateByScaleIDPipettelDICPAES ISM01.2(S3)MP8092705/30/202406/30/2024Sarabjit JaswalNoneMETALS_PIPE TTE_3 (A)



Recipe ID 1008	NAME ICPAES ISM01.2(S2)	<u>NO.</u> MP80928	<u>Prep Date</u> 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/11/2024
<u>FROM</u>	12.50000ml of MP80925 + 87.50000	nl of MP809	924 = Final Q	uantity: 100.00	0 ml		0(0)	
Decine				Evaluation	Dronorod			Supervised Dr

Supervised By		Prepared	Expiration				<u>lecipe</u>
ScaleID PipetteID Mohan Bera	<u>ScaleID</u>	<u>By</u>	<u>Date</u>	Prep Date	<u>NO.</u>	NAME	<u>ID</u>
None METALS_PIPE	None	Sarabjit Jaswal	06/30/2024	05/30/2024	<u>MP80931</u>	ICV-ICPAES	2054
TTE_3 (A) 06/11/2024							
		ml	ntity: 100.000	4 = Final Qua	of MP80924	10.00000ml of M5294 + 90.00000ml	ROM



<u>Recipe</u> <u>ID</u> 904	NAME ICP AES ICSA SOLN	<u>NO.</u> MP80932	<u>Prep Date</u> 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/11/2024
FROM	10.00000ml of M5130 + 90.00000ml	of MP80924	I = Final Qua	ntity: 100.000	nl			
Destine				F amiliantian	Description			

<u>Recipe</u> <u>ID</u>	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	PipettelD	Supervised By
905	ICP AES ICSAB SOLN	<u>MP80933</u>	05/30/2024		Sarabjit Jaswal		METALS_PIPE	Mohan Bera
							TTE_3 (A)	06/11/2024
FROM	10.00000ml of M5130 + 10.00000ml	of M5223 +	80.00000ml c	of MP80924 =	Final Quantity: 1	00.000 ml		



<u>Recipe</u> <u>ID</u> 1119	NAME ICPAES ISM01.2(CCV)	<u>NO.</u> MP80934	Prep Date 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	PipettelD METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/11/2024
<u>FROM</u>	12.25000ml of M5289 + 12.50000ml 125.00000ml of MP80925 + 322.750					8 + 7.50000ml (of M5769 +	
Desires				F orm in a time	Durant			Our sector d Dec

<u>Recipe</u> <u>ID</u>	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By
								Mohan Bera
2480	ICP AES STD 6 ISM01.3	<u>MP80935</u>	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE TTE_3 (A)	06/11/2024
]		TTL_3 (A)	00/11/2024
FROM	8.00000ml of M5200 + 8.00000ml of			5298 + 8.0000	0ml of M5498 +	8.00000ml of N	15769 +	
	60.00000ml of MP80924 = Final Qua	antity: 100.0	00 ml					



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Metals STANDARD PREPARATION LOG

<u>Recipe</u> <u>ID</u> 919	NAME ICP AES INTERNAL STD	<u>NO.</u> MP80942	Prep Date 05/30/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> None	Supervised By Mohan Bera 06/11/2024
FROM	1.00000ml of M4961 + 10.00000ml o ml	f M4960 + 1	969.00000ml	of W2606 + 20	0.00000ml of M5	915 = Final Qu	lantity: 2000.0	20

<u>Recipe</u> <u>ID</u>	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u> Mohan Bera
903	ICP AES RINSE SOLN	<u>MP80944</u>	05/30/2024	06/30/2024	Sarabjit Jaswal	None	None	06/11/2024
FROM	200.00000ml of M5915 + 9800.0000	oml of W260)6 = Final Qu	antity: 10000.0	00 ml			

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Recipe ID 3559	NAME SE 100PPM	<u>NO.</u> MP81024	Prep Date 06/12/2024	Expiration Date 06/30/2024	<u>Prepared</u> <u>By</u> Kareem Khairalla	<u>ScaleID</u> None	<u>PipetteID</u> None	Supervised By Mohan Bera 06/12/2024
FROM	1.00000ml of M4883 + 9.00000ml of	MP80924 =	Final Quanti	ty: 10.000 ml				

Recipe ID 2632	<u>NAME</u> TL 100.00PPM	<u>NO.</u> MP81025	Prep Date 06/12/2024	Expiration Date 06/30/2024	<u>Prepared</u> <u>By</u> Kareem Khairalla	<u>ScaleID</u> None	<u>PipetteID</u> None	Supervised By Mohan Bera 06/12/2024
<u>FROM</u>	1.00000ml of M4889 + 9.00000ml of	MP80924 =	- - Final Quanti	ty: 10.000 ml				



Recipe ID 921	NAME ICPAES SPIKE SOL#6	<u>NO.</u> <u>MP81026</u>	<u>Prep Date</u> 06/10/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	PipettelD METALS_PIPE TTE_3 (A)	Supervised By Mohan Bera 06/13/2024
FROM	0.12500ml of M4883 + 1.25000ml of	M5192 + 25	5.00000ml of N	/15754 + 23.62	500ml of MP809	24 = Final Qua		nl
Recipe	NAME	NO	Bron Dete	Expiration	Prepared	SeelelD	DinettelD	Supervised By

Recipe					riepareu			Supervised by
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	PipetteID	Mohan Bera
994	ICPAES ISM01.2 S1 (CONC.)	<u>MP81028</u>	06/10/2024	06/24/2024	Sarabjit Jaswal	None	METALS_PIPE	-
							TTE_3 (A)	06/13/2024
FROM	0.02000ml of M5815 + 0.03000ml of	M5429 + 0.	10000ml of M	4877 + 0.1000	0ml of M5798 +	0.14000ml of N	15799 +	
	0.20000ml of M4881 + 0.20000ml of	M4885 + 0.	20000ml of M	5298 + 0.2000	0ml of M5473 +	0.20000ml of N	15658 +	
	0.20000ml of M5801 + 0.20000ml of							
	0.50000ml of M5697 + 0.70000ml of							
	1.00000ml of M5800 + 1.20000ml of 10.00000ml of M5498 + 10.00000ml							
	33.51000ml of MP80924 = Final Qua			110010 - 2.00		5 · 4.00000111	01100303	



<u>Recipe</u> <u>ID</u> 169	NAME 1:1HNO3	<u>NO.</u> MP81119	Prep Date 06/21/2024			<u>ScaleID</u> METALS_SCA LE_2 (M SC-2)	
FROM	1250.00000ml of M5935 + 1250.000	Doml of W26	506 = Final Q	uantity: 2500.0			
Bacino				Expiration	Propared		Supervised By

<u>Recipe</u> <u>ID</u> 994	NAME ICPAES ISM01.2 S1 (CONC.)	<u>NO.</u> MP81208	Prep Date 06/25/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIPE TTE 3 (A)	Supervised By Mohan Bera 06/27/2024
FROM	0.02000ml of M5815 + 0.03000ml of 0.20000ml of M4885 + 0.20000ml of 0.20000ml of M5747 + 0.20000ml of 0.50000ml of M4889 + 0.50000ml of 1.00000ml of M5800 + 1.20000ml of 10.00000ml of M5468 + 10.00000ml 34.41000ml of MP80924 = Final Qua	M5192 + 0. M5801 + 0. M5697 + 0. M5224 + 1. of M5497 +	20000ml of M 20000ml of M 70000ml of M 20000ml of M 10.00000ml o	5298 + 0.2000 5817 + 0.3000 4883 + 0.8000 5819 + 10.000	0ml of M5473 + 0ml of M5698 + 0ml of M5494 + 00ml of M5200 -	0.20000ml of N 0.40000ml of N 1.00000ml of N + 10.00000ml o	15658 + 15289 + 15227 + f M5288 +	



Recipe ID 1003	NAME ICPAES ISM01.2 S1	<u>NO.</u> MP81209	Prep Date 06/25/2024		<u>Prepared</u> <u>By</u> Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipetteID</u> None	Supervised By Mohan Bera 06/27/2024
FROM	0.50000ml of MP81208 + 99.50000m	l of MP8092	24 = Final Qu	antity: 100.000) ml			



Standards, Inc.

ml

CHEMICAL RECEIPT LOG BOOK

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	072821	07/28/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4877
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57082 / Pb, 1000 PPM, 125 ml	062221	06/22/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4881
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	070221	07/02/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4883
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	072921	07/29/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4885
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57022 / Ti, 1000 PPM, 125 ml	070721	07/07/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4888
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	073021	07/30/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4889



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	100721	10/07/2024	10/09/2021 / jaswal	10/08/2021 / jaswal	M4960
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58139 / Y, 10000 PPM, 500 ml	052521	06/25/2024	10/09/2021 / jaswal	01/25/2019 / jaswal	M4961

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	11/19/2024	05/20/2024 / jaswal	04/20/2021 / bin	M5130

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	051722	05/17/2025	07/01/2022 / bin	06/17/2022 / jaswal	M5192

Opened By	Received Date / Received By	Chemtech Lot #
06/23/2022 / bin	10/05/2021 / bin	M5200
	06/23/2022 /	06/23/2022 / 10/05/2021 /

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	11/19/2024	05/20/2024 / jaswal	04/20/2021 / bin	M5223



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	101521	10/15/2024	06/29/2022 / bin	10/18/2021 / bin	M5224
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	100121	10/01/2024	07/01/2022 / bin	10/18/2021 / bin	M5227
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Antimony (Sb)	051822	05/18/2025	05/10/2023 / bin	08/24/2022 / jaswal	M5272
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	071122	07/11/2025	09/01/2022 / jaswal	07/21/2022 / jaswal	M5288
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #

			Date	Орепец Бу	Кесетуец Бу	LOL#
Absolute Standards, Inc.	58113 / Aluminum (Al) 10,000PPM	070622	07/06/2025	09/02/2022 / jaswal	07/12/2022 / jaswal	M5289
					-	

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	01/01/2025	12/13/2023 / bin	02/20/2020 / bin	M5294



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	S2-MEB711673	11/02/2026	09/19/2022 / jaswal	08/20/2022 / jaswal	M5296
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	020422	02/04/2025	05/02/2023 / jaswal	06/15/2022 / jaswal	M5298
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	11/01/2022 / jaswal	09/18/2022 / jaswal	M5387
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	04/29/2024 / kareem	09/18/2022 / bin	M5389
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB714159	01/13/2027	01/30/2024 / bin	09/19/2022 / bin	M5395
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57103 / Li, 10000 PPM, 125 ml	070622	07/06/2025	01/30/2023 / bin	01/26/2023 / bin	M5429



125 ml

Standards, Inc.

CHEMICAL RECEIPT LOG BOOK

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	120922	12/09/2025	03/14/2023 / jaswal	03/14/2023 / jaswal	M5468
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57138 / Sr, 10000 PPM, 125 ml	082922	08/29/2025	03/16/2023 / jaswal	03/16/2023 / jaswal	M5473
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	011223	01/12/2026	01/20/2023 / bin	01/19/2023 / bin	M5494
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	031523	03/15/2026	03/18/2023 / bin	03/17/2023 / bin	M5497
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	031523	03/15/2026	08/15/2023 / jaswal	03/17/2023 / bin	M5498
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards Inc	57182 / Pb, 10000 PPM, 125 ml	061522	06/15/2025	03/19/2023 /	03/17/2023 /	M5513

bin

bin



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	1403 / Hydrogen Peroxide, 30% 1 gal	820803	08/31/2024	01/03/2024 /jaswal	08/03/2022 / Al-Terek	M5632
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.	58025 / Mn, 1000 PPM, 500 ml	102623	10/26/2026	04/18/2024 / jaswal	10/27/2023 / jaswal	M5698
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Lead (Pb) 1000PPM	100923	10/09/2026	05/20/2024 / Jaswal	12/20/2023 / jaswal	M5747
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	52166 / ICP-AES Spike sample water matrix (18 comp.)	112823	11/28/2026	05/01/2024 / jaswal	12/15/2023 / jaswal	M5754



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	091823	09/18/2026	05/24/2024 / Jaswal	01/03/2024 / bin	M5769
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
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57050 / Sn, 1000 PPM, 125 ml	071123	07/11/2026	02/09/2024 / bin	02/09/2024 / bin	M5799
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	02/09/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817
Supplier	ItemCode / ItemName	Lot #	Expiration	Date Opened /	Received Date /	Chemtech

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Opened By	Received Date / Received By	Lot #
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 / jaswal	02/09/2024 / jaswal	M5818

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	111623	11/16/2026	03/20/2024 / jaswal	02/09/2024 / jaswal	M5819

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	T2-MEB714417	01/27/2027	04/19/2024 / jaswal	02/22/2024 / jaswal	M5875

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	240415	11/06/2024	06/04/2024 / Al-Terek	05/07/2024 / Al-Terek	M5895

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	11/29/2024	05/30/2024 / Al-Terek	05/24/2024 / Al-Terek	M5915



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22G2862015	12/08/2024	06/24/2024 / Al-Terek	06/07/2024 / Al-Terek	M5929
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	12/08/2024	06/21/2024 / Al-Terek	06/07/2024 / Al-Terek	M5935
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	12/20/2024	06/24/2024 / Al-Terek	06/18/2024 / Al-Terek	M5936
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
			Date		Received by	

M5296 OP: 09/19/2022 BH



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	n
Catalog Number:	CHEM-CLP-4	
Lot Number:	S2-MEB711673	
Matrix:	3% (v/v) HNO3 3% (v/v) HF	
Value / Analyte(s):	1 000 μg/mL ea: Boron, Silicon, Titanium	Molybdenum, Tin,

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Boron, B	CERTIFIED VALUE 1 000 ± 6 μg/mL	ANALYTE Molybdenum, Mo	CERTIFIED VALUE 1 000 ± 6 μg/mL	
Silicon, Si	1 000 ± 7 μg/mL	Tin, Sn	1 000 ± 6 µg/mL	
Titanium, Ti	1 000 ± 7 μg/mL			
Density:	1.030 g/mL (meas	sured at 20 ± 4 °C)		
Assay Information	n:			
ANALYTE	METHOD	NIST SRM#		SRM LOT#
B	ICP Assav	3107		110830

В	ICP Assay	3107	110830
Мо	ICP Assay	3134	130418
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	3162a	130925

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	Characterization of CRM/RM by One Method Certified Value, X _{CRM/RM} , where one method of characterization
used is the weighted mean of the results:	is used is the mean of individual results:
$X_{CRM/RM} = \Sigma(w_i) (X_i)$	X _{CRM/RM} = (X _a) (u _{char a})
X _i = mean of Assay Method i with standard uncertainty u _{char i}	X _a = mean of Assay Method A with
w_i = the weighting factors for each method calculated using the inverse square of the variance: $w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$	u _{char} a = the standard uncertainty of characterization Method A
CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k (u ² _{char} + u ² _{bb} + u ² _{lts} + u ² _{ts}) ^{1/2}	CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k (u ² char a + u ² bb + u ² lts + u ² ts) ¹
k = coverage factor = 2	k = coverage factor = 2
$\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method	u _{char a} = the errors from characterization
ubb = bottle to bottle homogeneity standard uncertainty	u _{bb} = bottle to bottle homogeneity standard uncertainty
u _{lts} = long term stability standard uncertainty (storage)	ults = long term stability standard uncertainty (storage)
u _{te} = transport stability standard uncertainty	ute = transport stability standard uncertainty

- 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

4.0

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

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

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

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

November 02, 2021

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

11.2 Lot Expiration Date

- November 02, 2026

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth Director, Quality Control

Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Paul R Line



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

3.0

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 So	lution
Catalog Number:	CLPP-CAL-1	
Lot Number:	T2-MEB714417	
Matrix:	5% (v/v) HNO3	
Value / Analyte(s):	5 000 μg/mL ea: Calcium, Magnesium,	Potassium, Sodium,
	2 000 μg/mL ea: Aluminum,	Barium,
	1 000 μg/mL ea: Iron,	
	500 μg/mL ea: Nickel, Zinc, Manganese,	Vanadium, Cobalt,
	250 μg/mL ea: Silver,	Copper,
	200 μg/mL ea: Chromium,	
	50 μg/mL ea: Beryllium	
CERTIFIED VALUE	S AND UNCERTAINTIES	

ANALYTE Aluminum, Al	CERTIFIED VALUE 2 000 ± 7 μg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 2 000 ± 9 μg/mL
Beryllium, Be	50.00 ± 0.26 μg/mL	Calcium, Ca	5 000 ± 22 μg/mL
Chromium, Cr	200.0 ± 1.0 μg/mL	Cobalt, Co	500.0 ± 2.4 μg/mL
Copper, Cu	250.0 ± 1.0 μg/mL	Iron, Fe	1 000 ± 4 μg/mL
Magnesium, Mg	5 000 ± 20 μg/mL	Manganese, Mn	500.0 ± 2.0 μg/mL
Nickel, Ni	500.0 ± 2.2 μg/mL	Potassium, K	5 000 ± 19 μg/mL
Silver, Ag	250.0 ± 1.1 μg/mL	Sodium, Na	5 000 ± 18 μg/mL
Vanadium, V	499.7 ± 2.2 μg/mL	Zinc, Zn	500.0 ± 2.2 μg/mL

Density:

1.118 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE Ag	METHOD ICP Assay	NIST SRM# 3151	SRM LOT# 160729
Ag	Volhard	999c	999c
AI	ICP Assay	3101a	140903
AI	EDTA	928	928
Ва	ICP Assay	3104a	140909
Ва	Gravimetric		See Sec. 4.2
Ве	ICP Assay	3105a	090514
Ве	Calculated		See Sec. 4.2
Са	ICP Assay	3109a	130213
Са	EDTA	928	928
Со	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cr	Calculated		See Sec. 4.2
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
К	ICP Assay	3141a	140813
К	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	120715
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
V	IC 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	Characterization of CRM/RM by One Method Certified Value, X _{CRM/RM} , where one method of characterization
used is the weighted mean of the results:	is used is the mean of individual results:
$X_{CRM/RM} = \Sigma(w_i) (X_i)$	X _{CRM/RM} = (X _a) (u _{char a})
X _i = mean of Assay Method i with standard uncertainty u _{char i}	X _a = mean of Assay Method A with
w_i = the weighting factors for each method calculated using the inverse square of the variance: $w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$	u _{char} a = the standard uncertainty of characterization Method A
CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k (u ² _{char} + u ² _{bb} + u ² _{lts} + u ² _{ts}) ^{1/2}	CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k (u ² char a + u ² bb + u ² lts + u ² ts) ¹
k = coverage factor = 2	k = coverage factor = 2
$\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method	u _{char a} = the errors from characterization
ubb = bottle to bottle homogeneity standard uncertainty	u _{bb} = bottle to bottle homogeneity standard uncertainty
u _{lts} = long term stability standard uncertainty (storage)	ults = long term stability standard uncertainty (storage)
u _{te} = transport stability standard uncertainty	ute = transport stability standard uncertainty

- 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

4.0

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

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

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

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

January 27, 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

- January 27, 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:

- 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

SD978Ci Paul R Saines



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 Soluti	on
Catalog Number:	CLPP-CAL-3	
Lot Number:	T2-MEB714159	
Matrix:	7% (v/v) HNO3	
Value / Analyte(s):	1 000 μg/mL ea: Arsenic, Selenium,	Lead, Thallium,
	500 μg/mL ea: Cadmium	

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Arsenic, As	CERTIFIED VALUE 1 000 ± 8 µg/mL	ANALYTE Cadmium, Cd	CERTIFIED VALUE 500.0 ± 2.1 μg/mL
Lead, Pb	1 000 ± 5 μg/mL	Selenium, Se	1 000 ± 8 μg/mL
Thallium, Tl	1 000 ± 7 μg/mL		

Density:

1.043 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
ТІ	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	Characterization of CRM/RM by One Method Certified Value, X _{CRM/RM} , where one method of characterization
used is the weighted mean of the results:	is used is the mean of individual results:
$X_{CRM/RM} = \Sigma(w_i) (X_i)$	X _{CRM/RM} = (X _a) (u _{char a})
X _i = mean of Assay Method i with standard uncertainty u _{char i}	X _a = mean of Assay Method A with
w_i = the weighting factors for each method calculated using the inverse square of the variance: $w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$	$\mathbf{u}_{char \ a}$ = the standard uncertainty of characterization Method A
CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k (u ² _{char} + u ² _{bb} + u ² _{lts} + u ² _{ts}) ^{1/2}	CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$
k = coverage factor = 2	k = coverage factor = 2
$\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method	u _{char a} = the errors from characterization
ubb = bottle to bottle homogeneity standard uncertainty	ubb = bottle to bottle homogeneity standard uncertainty
u _{lts} = long term stability standard uncertainty (storage)	ults = long term stability standard uncertainty (storage)
u _{te} = transport stability standard uncertainty	ute = transport stability standard uncertainty

- 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

4.0

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 13, 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

- January 13, 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:

- 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

SD978Ci Paul R Saines

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	*		Certified Reference Material CRM	eference M	Naterial CR	М		\$	AN AF https	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
<u>CERTIFIED WEIGHT REPORT:</u> Part Number: Lot Number: Description:	<u>57048</u> <u>072821</u> Cadmium (Cd)	ğ		Lot # 20370011	Solvent: Nitric Acid		Hind	forannie E	speate	~
Expiration Date:	072824			2.0%	40.0	Nitric Acid	Formulated By:		Giovanni Esposito	072821
Recommended Storage:	Ambient (20 °C)	C)			(111)		Ŋ	e de la construcción de la const		
Nominal Concentration (µg/mL):	611TB	л							India I Donton	862U
Volume shown below was diluted to (mL):		2000.02 0.058	58 Flask Uncertainty	/ 1119		E				01 505 1
	•			•	•	•	Expanded		SDS Information	ation
Compound Nu	Part Lot Number Number	Dilution Initial Factor Vol. (ml	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)		Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Uncertainty +/- (µg/mL)	(Solvent CAS#	OSHA PEL (TWA)	AS# OSHA PEL (TWA) LD50
1. Cadmium nitrate tetrahydrate (Cd) 58	58148 010920	0.1000 200.0	0.0 0.084	1000	10000.5		2.2	10022-68-1	0.2 mg/m3	orl-rat 300 mg/kg
[1] Spectrum No.1	-	3.363 sec]::	33.363 sec]:57048.D# [Count] [Linear]	Count] [Lin		1000.0				
1.0E8- -					nearj	1000.0				
m/z->					near]	1000.0				
2.0E4	N 0	8 <u>0</u>	40 0	ы О	10 ar] 60	1000.0 70		8 <u>.</u> 0	00	100
	N_ 0	<u>a</u> 0	40 0	თ_ 0		1000.0		õ	9 <mark>0</mark>	100
1.0E4	N O	8	4 0	<u>ຮ</u>	•	1000.0		ŏ	Ø O	100
1.0E4- m/z-> 110	120	13- 3-	40 0 0	150 0		1000.0 7 O		180	90 00	
	100 00	130	14 6	ក្ ទ		1000.0		81 Ö	000	





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

							Trace M	letals	Verifica	tion t	oy ICP-N	<u></u> (μς	J/mL)						
A1	<0.02	Cd	Т	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	< 0.02	W	<0.02
Sр	<0.02	C_a	<0.2	ĥ	<0.02	Ho	<0.02	Lu	<0.02	Ъ	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	Ч	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	< 0.01	O _s	<0.02	Rh	<0.02	Ag	<0.02	Ц	<0.02	<	<0.02
Ва	<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	Чł	<0.02
Be	<0.01	Ω	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	Р	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	°.	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pŧ	<0.02	\mathbf{Sm}	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Ĉ	<0.02	Au	<0.02	РЬ	<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.

sold in the second second

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).

www.absolutestandards.com Absolute Standards, Inc. 800-368-1131 CERTIFIED WEIGHT REPORT: Lead (II) Nitrate (Pb) Compound Nominal Concentration (µg/mL): m/z-> m/z-> m/z-> 2.0E6 5.0E4 Recommended Storage: 5.0E4 1.0E6 1.0E5-1.0E5 Volume shown below was diluted to (mL): **NIST Test Number:** Expiration Date: Part Number: Lot Number: Description: [1] Spectrum No.1 210 110 0 58182 Number Part <u>57082</u> 062221 Lead (Pb) 6UTB 1000 062224 Ambient (20 °C) 032321 Number Lot 120 N20 N_ 0 [14.144 sec]:58082.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor 130 230 β 5E-05 Vol. (mL) 0.058 200.0 Initial **Certified Reference Material CRM** Pipette (mL) Conc. (µg/mL) Balance Uncertainty Flask Uncertainty Uncertainty 40 N 40 0.084 40 20370011 Nominal Lot # 2.0% 1000 N 0 0 150 ທ 0 Conc. (µg/mL) Nitric Acid Solvent: 10000.1 Initial (mL) 40.0 260 160 00 Conc. (µg/mL) Nitric Acid 1000.0 Final 170 0 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Expanded 2.2 Revence 180 0 0 10099-74-8 Ś CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) Pedro L. Rentas ent Lawrence Barry 190 00 0.05 mg/m3 SDS Information 2 https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number 200 100 intrvns-rat 93 mg/kg 3128 LD50 062221 062221 SRM NIST





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

							Trace M	etals	Verifica	tion b	oy ICP-N	<u>μ</u>) Sl	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	ТЪ	<0.02	W	<0.02
Sp	<0.02	Ca	<0.2	Ęr	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<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	TI	<0.02	V	<0.02
Ва	<0.02	Cs	<0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	Р	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
в	<0.02	C	<0.02	Au	<0.02	Рь	Т	Nd	<0.02	Κ	<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.

In P. Sold

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).

www.absolutestandards.com Absolute Standards, Inc. 800-368-1131 CERTIFIED WEIGHT REPORT: Selenium(IV) oxide (Se) Compound Nominal Concentration (µg/mL): m/z-> m/z-> m/z-> 2.0E8-2.0E8-**Recommended Storage:** 1.0E8 1.0E8 1.0∏4 2.0E4 Volume shown below was diluted to (mL): **NIST Test Number:** Expiration Date: Part Number: Lot Number: Description: [1] Spectrum No.1 110 N10 1 0 58134 Number Part <u>57034</u> 070221 Selenium (Se) 070224 6UTB 1000 Ambient (20 °C) 021621 Number Lot N20 N<u>.</u> 0 120 [33.702 sec]:58034.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor α<u>.</u> Ο 230 130 5E-05 Vol. (mL) 0.058 200.0 Initial **Certified Reference Material CRM** Pipette (mL) Conc. (µg/mL) Balance Uncertainty Flask Uncertainty Uncertainty N40 40 4 0 0.084 20370011 Nominal Lot # 2.0% 1000 250 150 () 0 Conc. (µg/mL) Nitric Acid Solvent: 10000.2 Initial (mL) 40.0 6<u>0</u> N60 160 Conc. (µg/mL) Nitric Acid 1000.0 Final 170 07 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Expanded Giovannie 2.2 180 80 7446-08-4 ŝ CAS# (Solvent Safety Info. On Attached pg.) Labour OSHA PEL (TWA) Pedro L. Rentas Giovanni Esposito e de 190 0 SDS Information 0.2 mg/m3 https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number 200 100 orl-rat 68 mg/kg LD50 070221 070221 3149 NIST SRM

Part # 57034 Lot # 070221

1 of 2

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

							Trace M	Metals	Verifica	tion	by ICP-N	<u></u> μ) SI	g∕mL)						
			0												B				
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	\mathbf{Pr}	<0.02	Se	Т	ТЪ	<0.02	W	<0.02
Sp	<0.02	C_a	<0.2	Ę	<0.02	Ho	<0.02	Lu	<0.02	Np	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	Ц	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	O_{s}	<0.02	Rh	<0.02	Ag	<0.02	TI	<0.02	V	<0.02
Ва	<0.02	Cs	<0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Ч	<0.02
Be	<0.01	Ω	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	°°	<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	<0.02	Au	<0.02	Рь	<0.02	Nd	<0.02	Κ	<0.2	Sc	<0.02	Та	<0.02	Ti	<0.02	Zr	<0.02

(T)= Target analyte

Physical Characterization:

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

- All

Certified by:

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

- the preparation of all standards.
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- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above)
- * 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. Monodes 800-368-1131 Image: Standards.com CERTIFIED WEIGHT REPORT: Part Number: ST047 Lot Number: G72921 Description: Silver (Astronometed Storage: Moninal Concentration (µg/mL): Noume shown below was diluted to (mL): Noninal Concentration (µg/mL): Number: Monoinal Concentration (µg/mL): Hot Mumber: Mumber: 1. Silver nitrate (Ag) Fart Lot Silver nitrate (Ag) Coropourd Lot Silver nitrate (Ag) Silver nitrate (Ag)
000
1000
5.0E5
2.5E5-
m/z->

Part # 57047

Lot # 072921

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

									analyte	(T)= Target analyte									
<0.02	Zr	<0.02	Ti	<0.02	Та	<0.02	Sc	<0.2	K	< 0.02	Nd	<0.02	Рь	<0.02	Au	<0.02	Cu	<0.02	в
<0.02	Zn	<0.02	Sn	<0.02	s	<0.02	Sm	<0.02	Pt	<0.02	Mo	<0.02	La	<0.02	Ge	<0.02	C°	<0.02	Bi
<0.02	Y	<0.02	Tm	<0.02	\mathbf{Sr}	<0.02	Ru	<0.02	P	<0.2	Hg	<0.2	Fe	<0.02	Ga	<0.02	Ω	<0.01	Be
<0.02	Yb	<0.02	Th	<0.2	Na	<0.02	Rb	<0.02	Pd	<0.02	Mn	<0.02	ŀ	<0.02	Gd	<0.02	Cs	<0.02	Ba
<0.02	V	<0.02	Π	Т	Ag	<0.02	Rh	<0.02	$O_{\rm S}$	< 0.01	Mg	<0.02	In	<0.02	Eu	<0.02	Ce	<0.2	As
<0.02	U	<0.02	Te	<0.02	Si	<0.02	Re	<0.02	Nb	<0.02	Lu	<0.02	Ho	<0.02	Er	<0.2	C_a	<0.02	Sp
<0.02	W	<0.02	Ть	<0.2	Se	<0.02	Pr	<0.02	Ni	<0.02	Li	<0.02	Hf	<0.02	Dy	<0.02	Cd	<0.02	A1
						g/mL)	1S (μι	by ICP-N	ition	Verifica	letals	Trace N							
									•		•								

Physical Characterization:

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

n for the

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).

ADSOLUTE Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part Number:	Lot Number: Description:	Expiration Date:	Recommended Storage: Nominal Concentration (µg/mL):	NIST Test Number:	Volume shown below was diluted to (mL):		Compound	1. Ammonium hexafluorotitanate (Ti)	1.0E5	0. 0. 1. 	m/z->	2.0E8 	1.0E8- - -	m/z->	5.0E7 - - -	2.5E7	m/z->
· ·	nber:	nber: tion:	Date:	/mL):	nber:	ow was dil	Part	Number) 58122			10			110			210
	57022	<u>070721</u> Titanium (Ti)	070724	Ambient (20 °C) 1000	6UTB	uted to (mL):	Lot	er Number	2 070120			20			120			220
		<u>ii</u>	2	°C)	<u>5</u>	2000.02 0	Dilution	Factor Vc	0.1000 2			30			130			230
Certified					5E-05 Balance Uncertainty	0.058 Flask Uncertainty	Initial Uncertainty	Vol. (mL) Pipette	200.0 0.084			40			140			240
l Reference	Lot # 20370011	2.0%			certainty	tainty	y Nominal	Conc. (µg/mL)	1000			50			150			250
Certified Reference Material CRM	Solvent: Nitric Acid	40.0	(mL)				Initial	Conc. (µg/mL) Conc. (µg/mL)	10000.1			60			160			260
×.		Nitric Acid			R		Final		1000.0			70			170			
		Formulated By:		Kercu	Reviewed By:	-	Uncertainty	+/- (µg/mL)	2.2 16			8.0			180			
		lonce	~	a R	Pedi	ŋ	(Solvent S	CAS# OSH	16962-40-6 2.5			06			190			
ANAE AR-1 https://		Lawrence Barry	\mathcal{O}	à	Pedro L. Rentas		(Solvent Safety Info. On Attached pg.)	OSHA PEL (TWA)	2.5 (F) mg/m3									
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com		070721			070721	i	tached pg.)	LD50	NA			100			200			
Accredite ate Numbe ndards.con		21			721		NIST	SRM	3162a									

Part # 57022 Lot # 070721

1 of 2

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

							ITACE M	letais	Verilica		by ICP-M	<u>10 (µy</u>	J/ [[L]					ĺ	
AI	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	ТЪ	<0.02	W	<0.02
Sp	<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	U	<0.02
As	<0.2	ଜ	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	TI	<0.02	V	<0.02
Ва	<0.02	Cs	<0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Ве	<0.01	Ω	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	Р	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
B:	<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	<0.02	Au	<0.02	РЬ	<0.02	Nd	<0.02	Κ	<0.2	Sc	<0.02	Ta	<0.02	Ti	Т	Zr	<0.02

(T)= Target analyte

Physical Characterization:

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

In P. She

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.

* 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	rence Materia	I CRM			ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
<u>CERTIFIED WEIGHT REPORT:</u> Part Number: Lot Number: Description:	<u>57081</u> <u>073021</u> Thallium (TI)		203 -	Lot # Solvent: 20370011 Nitric Acid	hoid	Dimanni	mi Es	poste
1)	F	N	2.0% 40.0	0 Nitric Acid	Formulated By:		Giovanni Esposito
Expiration Date: Recommended Storage:	073024 Ambient (20 °C)			(mL)	.)	$\overline{\left\langle \right\rangle}$	A N	
Nominal Concentration (µg/mL):	1000					Jun	the ples	à
NIST Test Number:	6UTB	5E-05	Balance Uncertainty			Reviewed By:	Pedi	Pedro L. Rentas
Volume shown below was diluted to (mL):		2000.02 0.058	Flask Uncertainty			1 -	,	
	Part Lot	Dilution		Nominal	Final	Expanded	(Solvent S	Safety Info On Attar
Compound	Number Number	Factor Vol. (mL)	Pipette (mL)	nL) Con	Con	_) +/- (μg/mL)	CAS# OSH	# OSHA PEL (TWA) LD50
1. Thallium (TI)	58181 060920	0.1000 200.0	0.084 1	1000 10001.0	1.0 1000.0	2.2	7440-28-0 0	0.1 mg/m3 orl-rat 6700 mg/kg
[1] Spectrum No.1 2.0E6	ſ	14.044 sec]:57081.D# [Count] [Linear]	081.D# [Cou	nt] [Linear]				
1.0E6-								
m/z->	20							
1.0E4		30 0	4 0	ຫຼື 0	0 0	70	08	100
5000-		30	4 0	හ ර				
m/z-> 110		ω O	4 0	ຫຼື ວ				
1.0E6	1200	μ α ο	6 6 6					
5.0 E 5.0 E		μ 0 0	4 6 0					





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

		_	I	I	*	7.0	~		
	в	Bi	Be	Ва	As	Sb	Al		
	<0.02	<0.02	<0.01	<0.02	<0.2	<0.02	< 0.02		
	Cu	°.	$\Omega_{\mathbf{r}}$	C_{s}	Ce	C_a	Cd		
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.2	<0.02		
	Au	Ge	Ga	Gd	Eu	Er	Dy		
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
	Рь	La	Fe	ŀ	In	Ho	Hf		
	<0.02	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	Irace M	
	Nd	Mo	Hg	Mn	Mg	Lu	Li	letals	-
(T)= Target analyte	<0.02	<0.02	<0.2	<0.02	<0.01	<0.02	<0.02	Verificat	
analyte	K	Pt	P	Pd	O _s	Nb	Ni	tion	
	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	by ICP-N	
	Sc	Sm	Ru	Rb	Rh	Re	Pr	12 (M	5
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	g/mL)	
	Та	s	Sr	Na	Ag	Si	Se		
	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	<0.2		
	Ті	Sn	Tm	Th	TI	Te	Tb		
	<0.02	<0.02	<0.02	<0.02	Т	<0.02	<0.02		
	Zr	Zn	Y	Yь	V	U	W		
	<0.02	<0.02	<0.02	<0.02	< 0.02	<0.02	< 0.02		

Physical Characterization:

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

n f Slit

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

- * All standard containers are meticulously cleaned prior to use. the preparation of all standards.
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- * 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).

m/z->	N. 55 100	m/z-≻ 5.0E6	1.006	11/2-2 2.0E6	2.5E7	5.0E7	1. Indium Oxide (In)	Compound	Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	Expi	CERTIFIED WEIGHT REPORT: Part Lot	www.absolutestandards.com
210		110		10		[1] Spectrum No.1	IN086	RM#	Recommended Storage: Ambient (J Il Concentration (Jug/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Expiration Date:	<u>ORT:</u> Part Number: Lot Number:	п
220		120		NO		-	86 W1096A		Ambient (20 °C) 10000 6UTB uted to (mL): 50	100724	58149 100721 Indium (In)	
230		130		30		12.965 sec]	10000 99.999	Nominal Purity Conc. (µg/mL) (%)	0.06		-	NAGIO
240		140		4 0		12.965 sec]:57049.D# [Count] [Linear]	0.10	Uncertainty Purity (%)	5E-05 Balance Uncertainty 0.058 Flask Uncertainty		Solvent:	R: 10/08
250		150		50		[Count] [Lin	82.6 6.05408	Assay Target (%) Weight (g)	inty Y	5% 25.0 (mL)	Lot # ent: 20370011	121
260		160		0		ear]	6.05441	Actual Weight (g)		Nitric Acid	Nitric Acid	Ð
		170		70			10000.6 2	Exp Actual Unce Conc. (µg/mL) +/- (Revi	Form	re	
		180		80			20.1 1312-43-2	Expanded Uncertainty (Sol +/- (µg/mL) CAS#	Reviewed By:	Formulated By:	fioranci	
		190		00			NA	SDS Informa olvent Safety Info. On OSHA PEL (TWA)	Pedro L. Rentas	Giovanni Esposito	Cape	
		200		100			NA	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50			A	https://Absolutestandards.com
	n an						3124a	NIST	100721	100721		tandards.co

Part # 58149

Lot # 100721

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



Certified Reference Material CRM



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

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

							Trace Me	etals	Verificat	ion b	y ICP-MS	(hð	/mL)	-					
2	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	5	<0.02	N.	<0.02	- PA	<0.02	Se	<0.2	1 11 1	40.02	W	40.02
Sb	<0.02	Ca	<0.2	Ę	<0.02	Но	<0.02	L	<0.02	Nb	<0.02	Re	<0.02	S	<0.02	Te	<0.02	с	<0.02
As	<0.2	Ce	<0.02	E	<0.02	In	Т	Mg	<0.01	õ	<0.02	Rh	<0.02	Ag	<0.02	Н	<0.02	<	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	40.2	Th	<0.02	ΥЪ	<0,02
Be	<0.01	ĉ	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	C ₀	<0.02	ଜୁ	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	2	<0.02
в	<0.02	Cu	<0.02	Au	<0.02	РЬ	<0.02	Nd	<0.02	~	<02	Sc	<0.02	Ta	<0.02	Н	<0.02	Z	<0.02

(I)= larget analyte

Physical Characterization:

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

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Part # 58139 Lot # (m/z->	1.0E5	m/z-> 2.0E5	2.5E4	m/z-> 5.0E4	1.0E6	2.0E6	1. Yttrium (III) Oxide (Y)	Weight show Compound	NIST T	Recommended Storage: Nominal Concentration (µg/mL):	Π	<u>Ventiried weight her Ont.</u> Lot Des	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
Lot # 052521	210		110		10		[1] Spectrum No.1	INOR	Weight shown below was diluted to (mL):	NIST Test Number:	nended Storage: ntration (µg/mL):	-	Part Number: Lot Number: Description:	s, Inc.
	220		120		20		_	IN087 YV012015B1		6UTB	Ambient (20 °C) 10000	0.000	<u>58139</u> 052521 Yttrium (Y)	
	230		130		ů		12.624 sec	10000 99	2000.02 0.0 Nominal PL Conc. (µg/mL) ()	5E	°C)	ŀ		M4961
	240		140		40		12.624 sec]:58139.D# [Count] [Linear]	99.999 0.10	0.058 Flask Uncertainty Purity Uncertainty As (%) Purity (%) (5E-05 Balance Uncertainty			Solvent:	Certified
1 of 2	250		150		თ O		[Count] [Lin	77.9 25.6744	inty Assay Target (%) Weight (g)	ainty	(11)	2% 40.0	Lot # 20370011	Certified Reference Material CRM $\mathcal{R}_{1} = \left[\frac{1}{2} \right] \left[\frac{1}{2} \right] \left[\frac{1}{2} \right] \left[\frac{1}{2} \right]$
	260		160		0		ear]	25.6745	Actual Actual) Weight (g) Conc. (µg/mL)			Nitric Acid	Nitric Acid	aterial CRM
			170		70			10000.0		Re		Fo]	
			180		80			20.0 1314-36-9	Expanded Uncertainty (1 +/- (µg/mL) CAS#	Reviewed By:	Herein	Formulated By:	Ada	
Printed: 10/7/2			190		90			6-9 NA	Solvent O	Pedro L. Rentas	ten	Lawrence Barry	une B	
Printed: 10/7/2021, 2:18:04 PM			200		100				SDS Information Safety Info. On Attached SHA PEL (TWA)	ntas	81	arry	Vr.	ANAB ISO AR-1539 (https://Abso
PM	×							NAN	0	052521		052521		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
						an data an		NA	NIST					adited s.com

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



Certified Reference Material CRM



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

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

<0.02	Zr	<0.02	Ti	<0.02	12	20.02	90	7.0>	2	10.02	240		1.0		de la constante de	And the other designs of the o			A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER OWNE
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3	7	200	5	c0 0>	2	<0.02	Sm	<0.02	Pt	<0.02	Mo	<0.02	La	20.02	G	20.01	5	10.01	J !
-	Y	<0.02	Tm	<0.02	Sr	<0.02	Ru	<0.02	7	7.0>	gu	101		0.01	2	202	5	<0.02	<u>R</u> .
20.02	ID	20.02	111	10.2	144	10.01	1	10.01	, ;	3	H,	5	ជ	300	<u>_</u>	40.02	ç	<0.01	Be
	\$	3	ţ	5	Ş	000	R	2002	Pd	<0.02	Mn	<0.02	Ir	<0.02	Gd	20.02	S	20.02	La
<0.02	<	<0.02	П	<0.02	Ag	<0.02	Rh	<0.02	Os	<0.01	Mg	<0.02	III	10.02		0.01	2		ជ
<0.02	0	<0.02	Je	20.02	IC	10.02	20	10.02	110	10.01	1	3	5	502	IJ	c0 0>	C.	<0.2	As
10.01	: :		4	3	2	3	D	200	Ş	c0 0>	Im	<0.02	Ho	<0.02	q	<0.2	Ca	20.02	30
ca h	W	<0.02	4L	402	Se	<0.02	P	<0.02	Z	<0.02	5	20.02	111	10.02	5		2	5	7
South and a second second second	and a second	「「ない」というないです。										202	1 311	20 02	Dv	20.02	Cd	<0.02	AI
	No. of Concession, name		and the second se								No. of Street, or Stre		Strate and		Constraints and	and the second second	State States		
						Ja/mL)	40 (L	by ICP-I	TION	vernica	clais	I ACE IVIE							T
A REAL PROPERTY AND A REAL		And the second se	and the second se				5	5		Solin I	+>		_						

(T)= Target analyte

Physical Characterization:

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

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Part # 58139 Lot # 052521

3



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

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.
 - **<u>CAUTION</u>**: Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of 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: AI, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,

RM ICP-AES ICSA-1211 B-0710 SFAM.docx

Page 1 of 2

QATS Form 20-007F189R01, 01-17-2023



The Quality Assurance Technical Support (QATS) contract is operated by APTIM Federal Services, LLC.



ICSA

M5126

M5127

M5128

M5129

M5130

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			ERENCE CH	IECK SAMPL CSB-0710	E ICP-AES IO	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)
AI	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
Са	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Со	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.

m/z->	1.0E6	2.0E6	m/z->	1000	2000	1.0E5	2.0E5	1. Ammonium molybdate (Mo)	Compound	Volume show	NIST Tes	Recommended Storage: Nominal Concentration (µg/mL):	Expire	Part Lot Des	CERTIFIED WEIGHT REPORT:	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
210			110		đ		[1] Spectrum No.1		Nur	vn below was o	NIST Test Number:	d Storage: n (µg/mL):	Expiration Date:	Part Number: Lot Number: Description:		s, Inc.
2			120		N		No.1	58142 022222	Part Lot Number Number	Volume shown below was diluted to (mL):	6UTB	Ambient (20 °C) 1000	051725	57042 051722 Molybde		-
							[8.594	0.1000	Dilution Factor	3000.41		20 °C)		<u>57042</u> <u>051722</u> Molybdenum (Mo)		
			130		G		sec]:5704	300.0	Initial Un Vol. (mL) Pip	0.058 Flas	5E-05 Bala					M.S.
			140		40 0		8.594 sec]:57042.D# [Count] [Linear]	0.084	Uncertainty N Pipette (mL) Conc	Flask Uncertainty	Balance Uncertainty			MKE	_	Certified Rep M.5192
			150		50		unt] [Líne	1000	Nominal Conc. (µg/mL) Co				0.5%	MKBQ8597V Am	Lot #	ference M.
			160		60)ar]	10001.0	Initial Conc. (µg/mL) C				15.0 ×	Ammonium hydroxide		Certified Reference Material CRM いちいのえいたいのんりはてい
			170		70			1000.0	Final Conc. (µg/mL)	Г			Ammonium hydroxide	æ	-	M 172
								2.1	Expanded Uncertainty +/- (µg/mL)		Reviewed By:	N's	Formulated By:	A		
			180		80			13106-76-8	(Solve CAS#			to I		deronce		•
			190		90			5 mg(Mo)/m3	SDS Information nt Safety Info. On Attac OSHA PEL (TWA)		Pedro L. Rentas	era	Lawrence Barry	An		nt 、
			200		100			13 orl-rat 333 mg/kg	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50		s 051722	/	rry 051722	Ψ		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
								kg 3134	NIST		722		722			4 Accredite ate Numbe ndards.com

Part # 57042 Lot # 051722

1 of 2

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	Inc



Certified Reference Material CRM



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

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

							Trace M	letals	Verifica	ition	by ICP-N	IS (µ	g/mL)						
A	<0.02	ß	40.02	Dv	20.02	Ηŕ	3	1	-	1									
SP SP	A).02	Ĵ,	2.0	7 5	10.02	1	<0.02	' E	20.02	N	<0.02	P	<0.02	Se	<0.2	4L	<0.02	W	<0.02
<u>,</u>		2	10.2	5	20.02	Ho	<0.02	Lu	<0.02	ß	<0.02	Re	<0.02	Si	40.02	5	<0.02	11	4000
2	202	ŝ	20.02	E	<0.02	h	<0.02	Mg	<0.01	ò	<007	Rh	50	۸,	2003	3	3	: (
Ba	40.02	S	<0.02	3	300	7	3	ξ,	2	2			10.02	26	70.02		20.02	<	20.02
Be	5	?	3	2	20.02	l =	70.02	UTAT	20.02	Pd	<0.02	Rb	<0.02	Na	40.2	Ъ	<0.02	ΥЪ	<0.02
	-	2	70.02	Ca	<0.02	He	<02	Hg	40.2	P	<0.02	Ru	<0.02	S	40.02	J	2002	<	2003
Id	20.02	6	40.02	ଜ	<0.02	5	40.02	Mo	÷	¥	2003	ŝ	202	0	5	>		1,	10104
ω	40.02	6	<0.02	An	3	ş	3	E		; ;	TO'NE	UH	70.02	0	20.05	Sn	20.02	5	<0.02
					10.01	0.1	20.05	ING	20.02	~	40.2	Sc	<0.02	Ta	<0.02	Т	<0.02	72	<0.02
																			And in the second secon

(T)= Target analyte

Physical Characterization:

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

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Part # 57042 Lot # 051722

m/z->	N.5E6	m/z-> 5.0E6	2.5E6	m/z->	N 5 10 5	5.0E5	1. Sodium nitrate (Na)	Compound	B00-368-1131 WWW.absolutestandards.com CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	Absolute Standards, Inc.
210		1 10		10		[1] Spectrum No.1	INC	R	itandards.com	s, Inc.
220		120		NO		No.1	IN036 NAV01201511	Lot RM# Number	58111 092121 Sodium (Na) 092124 Ambient (20 °C) 10000 6UTB Iuted to (mL): 30	
230	ä	130		a o		8.935 sec	10000 9	Nominal F Conc. (µg/mL)	0000.41	
240		140		40]:58111.D#	99.999 0.10	Purity Uncertainty (%) Purity (%)	Certified Re Solvent 2% 5E-05 Balance Uncertainty 0.058 Flask Uncertainty	
250		150		თ O		8.935 sec]:58111.D# [Count] [Linear]	27.0 111.1274	Assay Target (%) Weight (g)	Certified Reference Material CRM	
260		160		0		near]	74 111.1433	t Actual (g) Weight (g)	Material CRI	
		170		70				Actual (Conc. (µg/mL))
		180		80			General Content	Expanded Uncertainty +/- (µg/mL) C	Formulated By: Reviewed By:	
		190		80			7631-99-4 5	Solvent Saf CAS# OSH/		D
							5 mg/m3	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDS(Giovanni Esposito	ΔΝΔ
		00		100			orl-rat 3236 mg/kg	on tached pg.) LD50	AR-1539 Certificate Number https://Absolutestandards.com	ANAR ISO 1703/ Accredited
- M							0	NIST		Annonliton

Part # 58111 Lot # 092121

1 of 2

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	Inc.



Certified Reference Material CRM



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

							Trace M	etals	Verifica	ition	by ICP-N	H) SI	g/mL)						
	200																		
A	<0.02	8	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	40.2	41	40.02	W	<0.02
Sb	<0.02	G	<0.2	막	<0.02	Но	<0.02	Ľ	<0.02	Nb	<0.02	Re	<0.02	S	<0.02	Te	<0.02	C	<0.02
As	<0.2	S	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	SO	<0.02	Rh	<0.02	Ag	<0.02	Н	<0.02	V	<0.02
Ba	<0.02	S	<0.02	Gd	<0.02	١٢	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	T	Ц	<0.02	YЪ	<0.02
Be	<0.01	ç	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	Р	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	S	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Z	<0.02
u.	<0.02	6	<0.02	Au	<0.02	Рb	<0.02	Nd	<0.02	ĸ	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02
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Physical Characterization:

(T)= Target analyte

Certified by:

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

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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 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).

Part # 58111 Lot # 092121



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

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.
 - **<u>CAUTION</u>**: Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of 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: AI, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,

RM ICP-AES ICSA-1211 B-0710 SFAM.docx

Page 1 of 2

QATS Form 20-007F189R01, 01-17-2023



The Quality Assurance Technical Support (QATS) contract is operated by APTIM Federal Services, LLC.



ICSA

M5126

M5127

M5128

M5129

M5130

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			ERENCE CH	IECK SAMPL CSB-0710	E ICP-AES IO	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)
AI	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
Са	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Со	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.

800-368-1131 www.absolutestandards.com		•		Certified	Certified Reference Material CRM	Material C	RM			¥	AR-1 https://	AR-1539 Certificate Number https://Absolutestandards.com	ficate Nu tandards
<u>CERTIFIED WEIGHT REPORT:</u> Part Number: Lot Number: Description:	<u>57051</u> 101521 Antimo	<u>57051</u> <u>101521</u> Antimony (Sb)			Lot # 20370011	Solvent: Nitric Acid		ALC.	Hierannie	E	poste		
	1 1 7				2.0%	40.0	Nitric Acid	Formulated By:	d By:	Giovann	Giovanni Esposito	10	101521
Expiration Date:	101524	24				(mL)			7	\checkmark			
Recommended Storage:	Ambie	Ambient (20 °C)						M	5	the second	ð		
NIST Test Number:	6UTB		5E-05	5 Balance Uncertainty	vrtainty			Reviewed By:	By:	Pedro L	Pedro L. Rentas	10	101521
Volume shown below was diluted to (mL):	as diluted to (mL): 2000.25			linty			Fynanded		SDS	SDS Information		
		bor Eactor	on Initial				Final		000	olvent	nt Safety Info. On At	Inched pg.)	NIST
												-	
[1] Spectrum No.1 5.0E5	JM No. 1	[17.96	4 sec]:5	8051.D#	17.964 sec]:58051.D# [Count] [Linear]	_inear]							
N .თ ლ უ													
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

									analyte	(T)= Target analyte									
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Zn		<0.02	Sn	<0.02	s	<0.02	\mathbf{Sm}	<0.02	₽ŧ	<0.02	Mo	<0.02	La	<0.02	Ge	<0.02	Co	<0.02	Bi
ч		<0.02	Tm	<0.02	Sr	<0.02	Ru	<0.02	P	<0.2	Hg	<0.2	Fe	<0.02	Ga	<0.02	Ω	<0.01	Be
	Yb	<0.02	Th	<0.2	Na	<0.02	Rb	<0.02	Pd	<0.02	Mn	<0.02	ŀ	<0.02	Gd	<0.02	Cs	<0.02	Ba
		<0.02	TI	<0.02	Ag	<0.02	Rh	<0.02	Os.	<0.01	Mg	<0.02	In	<0.02	Eu	<0.02	Ce	<0.2	As
		<0.02	Te	<0.02	Si	<0.02	Re	<0.02	Ŋ	<0.02	Lu	<0.02	Ho	<0.02	Er	<0.2	C_a	Т	Sp
×		<0.02	Ть	<0.2	Se	<0.02	Pr	<0.02	Ni	<0.02	Li	<0.02	Hf	<0.02	Dy	<0.02	Cd	<0.02	AI
						g/mL)	1S (µc	by ICP-M	tion I	Verificatio	letals	Trace M							
						•	•			•	•								

Physical Characterization:

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

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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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OCERTIFIED WEIGHT REPORT: CERTIFIED WEIGHT REPORT: CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Lot Number: Lot Number: Valuadium Description: Valuadium Notional Concentration (ug/mL): Notional Concentration (ug/mL): Volume chorent chorent chorent chorent colspan=	57023		č	of Deliver	1	CO Joinetek			4	AP	ANAB ISO 17034 Accredited	Accredited
CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number:	57023		C.	runea He	terence l	Certified Reference Material CHM		EF)		http:	AR-1539 Certificate Number https://Absolutestandards.com	te Numbe dards.com
Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Volume shown bolow wee	<u>100121</u> Vanadium (V)	s		5	Lot # 20370011	Solvent: Nitric Acid	L	Hierannie	nni E	aperto		
Nominal Concentration (Jg/mL): NIST Test Number: Volume shown holow was	100124 Ambient (20 °C)	1 0			2.0%	60.0 (mL)	Nitric Acid	Formulated By:	4	Giovanni Esposito	100121	
A DIALITE SHOWIN DELOW WAS	6UTB 6UTB diluted to (mL):	3000.4	5E-05 B 0.06 F	Balance Uncertainty Flask Uncertainty	×			Reviewed By:		Pedro L. Rentas	100121	
Compound	Part Lot Number Number			Uncertainty Pipette (mL) Co	ν Nominal Conc. (μg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	(Solve CAS#	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	ation Attached pg.) LD50	NIST
1. Ammonium Metavanadate (V) 58	58123 070721	0.1000	300.0	0.084	1000		1000.0	2.1	7803-55-6	1.0 mg/m3	orl-rat 630 mg/kg	3165
2.0E6	-	4.243 se	c]:5802	34.243 sec]:58023.D# [Count] [Linear]	Inne ILLin	iear]	۵.					
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m/z->	120	130		140	150	160	170		180	190	200	
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m/z-> 210	220	230		240	250	260						

Part # 57023 Lot # 100121

1 of 2

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

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Physical Characterization:

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

Certified by:

Sar P.

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m/z->	1.067	m/z-> 2.0E7	N .01 11 01	5.0百万	N. 01 01 01	5.0ES	1. Antimony (Sb)	Compound	NIST Te Volume shc	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	Contractory Mercons nervors: Lo De	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
1210		110		1.		[1] Spectrum No.1	58	N. P	NIST Test Number: ume shown below was	Expiration Date: nended Storage: ntration (µg/mL):	Part Number: Lot Number: Description:	∃ s, Inc.
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240		140		<u>4</u>		17.964 sec]:58051.D# [Count] [Linear]	300.0 0.084	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)	5E-05 Balance Uncertainty 0.058 Flask Uncertainty			0.9
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2 0		100		8 <u>.</u> 0				Initial Conc. (µg/mL) Conc		60.0 Nit (mL)	Solvent: Nitric Acid	aterial CRM
		170		70				Expanded Final Uncertainty Conc. (µg/mL) +/- (µg/mL)	Reviewed By:	Nitric Acid Formulated By:	J.C.	
		180		80			7440-36-0	CAS	ad By:	ated By:	haranni	-
		190		ů O				SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	Pedro L. Rentas	Giovanni Esposito	Esposite	htt
		200		100				mation On Attached pg.) A) LDSO	as 051822	la 051822	V.	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
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Part # 57051 Lot # 051822

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

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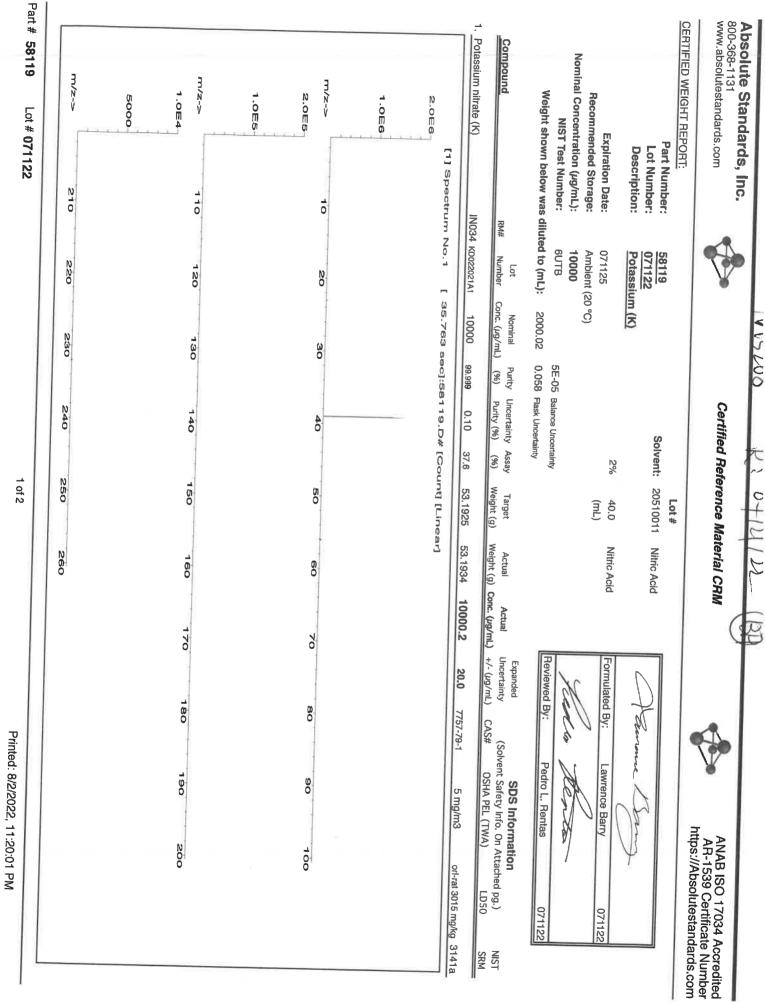
Physical Characterization:

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

Certified by:

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



Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	Certified Reference Material CRM	*	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
Instrumental Analysis by Indu	Mass Spec		
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 Standards are prepared gravimetriculously cleaned prior to use. Standards are certifed (+/-) 0.5% of the stated value, unless All standards should be stored with caps tight and under apping the uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelin Measurement Result," NIST Technical Note 1297, U.S. Govern 	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 1305		
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	Inc.
	800-368-1131



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

							race Me	etais	Verifica	ation	by ICP-	MC (hg/mr)						
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Physical Characterization:

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

(T)= Target analyte

Certified by:

In P. Mr.

* 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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QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program" R : 以120 2 [

Instructions for QATS Reference Material: Inorganic ICV Solutions

QATS LABORATORY INORGANIC REFERENCE MATERIAL INITIAL CALIBRATION VERIFICATION SOLUTIONS (ICV1, ICV5, AND ICV6)

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.
 - **<u>CAUTION</u>**: Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Metals in Dilute Acidic or Cyanide in Basic Aqueous Solutions HAZARDOUS MATERIAL

> Safety Data Sheets Available Upon Request



(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more Aqueous Inorganic Reference Materials containing various analyte concentrations. ICV1 and ICV5 are in a matrix of dilute nitric acid. ICV6 is in a matrix of dilute basic solution. For the reference material source in reporting ICVs use "USEPA". For the reference material lot number for the ICV1, ICV5, and ICV6 solutions use "ICV1-1014", "ICV5-0415", and "ICV6-0400", respectively.

(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 Initial Calibration Verification Solutions (ICVs) are to be used to evaluate the accuracy of the initial calibrations of ICP, AA, and Cyanide colorimetric instruments, and are to be used with the CLP SOWs and revisions. The values for each element in the ICVs are listed below in $\mu g/L$ (ppb) for the resulting solution(s) after the dilution of the concentrate(s) according to the following instructions. Use Class 'A' glassware to prepare the solution(s).

ICV1-1014 For ICP-AES analysis, use a 10-fold dilution by pipetting 10 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid.

RMs ICV 1, 5, 6 SFAM.docx

Page 1 of 2

QATS Form 20-007F188R00, 04-19-2021



The Quality Assurance Technical Support (QATS) contract is operated by APTIM Federal Services, LLC.



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

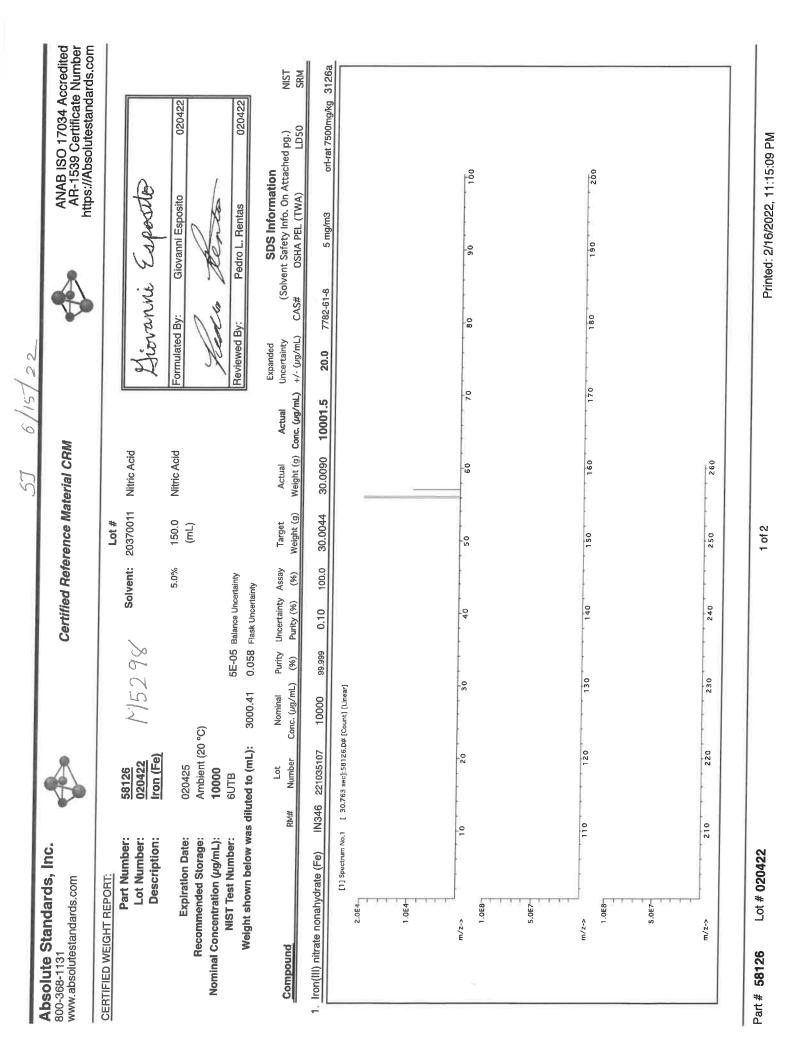
AP11MInstructions for QATS Reference Material: Inorganic ICV SolutionsICV1-1014For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate
into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.ICV5-0415For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting
1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume
with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v) K2Cr2O7
and 5% (v/v) nitric acid.ICV6-0400For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6
concentrate into a 100 mL volumetric flask and dilute to volume with Type II water.
Distill this solution along with the samples before analysis. The cyanide concentrate
is prepared from K3Fe(CN)6, Type II water, and 0.1 % sodium hydroxide, and will
decompose rapidly if exposed to light.

NOTE: USE TYPE II WATER AND HIGH-PURITY ACIDS FOR ALL DILUTIONS.

(D) CERTIFIED CONCENTRATIONS OF QATS ICV1, ICV5, AND ICV6 SOLUTIONS

	ICV1-1014	
Element	Concentration (µg/L) (after 10-fold dilution)	Concentration (µg/L) (after 50-fold dilution)
AI	2500	500
Sb	1000	200
As	1000	200
Ba	520	100
Be	510	100
Cd	510	100
Ca	10000	2000
Cr	520	100
Co	520	100
Cu	510	100
Fe	10000	2000
Pb	1000	200
Mg	6000	1200
Mn	520	100
Ni	530	110
K	9900	2000
Se	1000	200
Ag	250	50
Na	10000	2000
TI	1000	210
V	500	100
Zn	1000	200

	ICV5-0415		ICV6-0400
Element	Concentration (µg/L) (after 100-fold dilution)	Analyte	Concentration (µg/L) (after 100-fold dilution)
Hg	4.0	CN [.]	99



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

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:

Sur P

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NIST fest Number: 6UTB SE-05 Bance Unordary Lot Nominal Purity Uncertainty Assy Taget Actual Bance Intrate (Ba) IN023 excame 1000 99.99 0.10 E23 3.82417 3.82426 1:0E8 [1] Spectrum No.1 [1] 12.514 sec):69156.0/f [Count] [Linear] 2:0E8 11.0E8 11.0E8 1 20 30 40 50 60 2:0E5 10 120 130 140 150 160 50
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

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

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Certified by:

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Compound New Number Core: (up/m.) (%) Parity (%) (%) Weight (0) Weight (0)
[1] Spectrum No.1 [12.514 sec]:58156.D# [Count] [Linear] E8 E5 E5 E6 E6 E6 E6 E6 E6 E6 E6 E6 E6 E6 E6 E6
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m/z-> 210 220

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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.

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	By: Lawrence Barr By: Lawrence Barr Jy: Pedro L. Renta SDS Info. (Solvent Safety Info.	7790-69-4		Printed: 1/18/2023, 4:01:43 PM
A	Formulated Formulated Reviewed E Actual Uncertainty	-H - H	۶ <u>۲</u>	
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Certified Reference Material CRW	Solvent: Solvent: Solvent: 2% 5E-05 Balance Uncertainty 0.058 Rask Uncertainty Purity Uncertainty Assay (%) Purity (%) (%)	10.0	8103:D#[C 240 240 240 240	
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Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Lot Number: Description: Expiration Date: Thilum (070622 Recommended Storage: Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): Neight shown below was diluted to (mL): Compound RM# Number	1. Lithium nitrate (Li) IN01	[1] Spectrum No.1 1.0E6 5.0E5 m/z-> 10 500 500 500 10 10 10 10 10 10 10 10 10	

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

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Physical Characterization:

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Lot # 070622 Part # 57103

m/z->	1.064	11/2-V 2.0 E4	1000	m/z-> 2000	5.0E5	1.0 mg	Magnesium nitrate hexativdrate (Mg) IN030 мампахам	Weight sho	Expiration Date: Recommended Storage: Nominal Concentration (ug/mL): NIST Test Number:	CERTIFIED WEIGHT REPORT: Part Lot Dee	www.absolutestandards.com
210		110	·	۵. 0 ¹	5.	[1] Spectrum No.1	ahydrate (Mg) IN		Expiration Date: Recommended Storage: I Concentration (ug/mL): NIST Test Number:	<u>ORT:</u> Part Number: Lot Number: Description:	Ň
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		₽ 0		10	4 . T		NA	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDSC	entas	Esposito	THOSE AND ADDR
			,				ort-rat 5440 mg/kg 3131a	ed pg.) LD50 SRM	120922	120922	

Part # 58112

Lot # 120922

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Absolute Standards, Inc. 300-368-1131 www.absolutestandards.com

Certified Reference Material CRM



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

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Be	40.01	ບັ	<0.02	ଞ	0.0≥	Fe	<0.2	Hg	<0.2	'n,	<0.02	Ru	20.0≥	S.	<0.02	Ę	2008	>	200
ä	<0.02	රී	<0.02	ප්	<0.02	La	\$0.02	Mo	40.02	Å,	<0.02	Sm	<0.02		000	9	200	1	000
B	<0.02	õ	<0.02	Au	<0.02	£	<0.02	PN	20.02	K	<0.2	ŝ	40.02	, E	<0.02	i F	40.02	3 2	2002
									(T) = Targ	pet analy	yte								

Physical Characterization:

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

Certified by:

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Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	•	NA KAQ/L Certified Reference Material	Certified Re	erence Ma	terial CRM		>		ANAE AR-1	ANAB ISO 17034 Accredited AR-1539 Certificate Number	Accredit te Numb
CERTIFIED WEIGHT REPORT:				Lot #	Solvent:	Vent 10	44	(
Part Number: Lot Number: Description:	57028 011223 Nickel (Ni)			20510011 N	Nitric Acid		Giovanni		Especto		
Expiration Date:	011226			2.0%		Nitric Acid For	Formulated By:	Giova	Giovanni Esposito	011223	ျပဳ
Recommended Storage: Nominal Concentration (µg/mL):	Ambient (20 °C) 1000	Ċ			(111)		N.	er.			
NIST Test Number:	6UTB			thγ		Re	Reviewed By:		Pedro L. Rentas	011223	ω
volume shown below was diluted to (mL):	is diluted to (mL):	2000.02 0.058	B Flask Uncertainty								L
		Dilution Initial	IUncertainty	Nominal	Initial	Final u	Expanded Uncertainty	SI (Solvent Sa	SDS Information (Solvent Safety Info. On Attached pg.)	n ached pg.)	NIST
	Number Number	Factor Vol. (mL)	Pipette (mL)	Conc. (µg/mL) Co	Conc. (µg/mL) Conc. (µg/mL)		+/- (µg/mL)	CAS# OSHA	OSHA PEL (TWA)	LD50	SRM
1. Nickel(II) nitrate hexahydrate (Ni)	58128 033122	0.1000 200.0	0.084	1000	10000.9	1000.0	2.2 13	13478-00-7 1	1 mg/m3 o	orl-rat 1620 mg/kg	3136
[1] Spectrum No.1	-	9.135 sec]:56	sec]:58028.D# [Count] [Linear]	bunt] [Linea	5						- 11
1.0 ጠ											
5000 	NO	30	40 0	50 0	60 0	70	80	90	100	ŏ	
2500-											
1.067	- N C	130	140	150	160	170	180	190	200	Ō	
51, O 田 の											
- 1 x x											
m/z-> 210	N N O	230	240	250	N 0						
Part # 57028 Lot # 011223				1 of 2				Drintad: 0/15/0000 11.00.00 DM			

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≤ 00



Certified Reference Material CRM



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

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

								5	at analu	(T) - Tarrat analyta									
<0.02	Z	<0.02	Ħ	<0.02	Ta	<0.02	Sc	<0.2	×	<0.02	Nd	<0.02	Pp	20.05	Au	<0.02	5	50.02	Ŀ
<0.02	Z'n	<0.02	Sn	<0.02	s	<0.02	Sm	<0.02	Pt	<0.02	Mo	<0.02	La	<0.02	Ge	<0.02	2 8	-0.02	a þ
<0.02	Y	<0.02	Tm	<0.02	Sr	<0.02	Ru	<0.02	P	<0.2	Hg	<0.2	Fe	<0.02	Ga	<0.02	2	<0.01	, p
<0.02	Υь	<0.02	Th	<0.2	Na	<0.02	Rb	<0.02	Pd	<0.02	Mn	<0.02	F	<0.02	a G	<0.02	ي ک	<0.02	Ба
<0.02	<	<0.02	П	<0.02	Ag	<0.02	Rh	<0.02	°0	<0.01	Mg	<0.02	5	20.02	2 8	<0.02	ې د	5 6	D ₂
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							50 0	JY ICP-M		VEILICA	GLAIS								T
							2				0+3	Trana M							

(1) = 1 anglet at target

Physical Characterization:

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

Certified by:

In P. S.

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	031523	on ttached pg.) NIST LD50 SRM ont-rat >2000mo/kg 3109a	Ő	O O N
ARA	Ped X Gio	SDS Information (Solvent Safety Info. On Attached pg.) CSHA PEL (TWA) LD5C C	-0 0	190
MUXCITI	Formulated By: Reviewed By:	Expanded Uncertainty +/- (µg/mL) CAS: 20.0 471-34	Q R	170
120		Actual Actual Weight (g) Conc. (ug/mL) 75.2093 10001.4	So	1900 1900 1900
Certified Reference Material CRM	Lot # Solvent: 21110221 2% 60.0 (mL) Uncertainty sentainty	Uncertainty Assay Target Purity (%) (%) Weight (g) 0.10 38.9 75.1990	0.D# [Count] [Line	140 150 240 250
NV5497	5E-05 Balance 00.41 0.058 Flask Un	Nominal Purity Uncertainty Conc. (<i>ug/m</i> L) (%) Purity (%) 10000 99.999 0.10	30 30 30 30 30 30 30 30 30 30 30 30 30 3	- 30 5 7 30 7 30 7 30
	58120 031523 031526 031526 Ambient (20 10000 6UTB 6UTB 6UTB	Lot A RM# Number Con	10 To 1 12	220
Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part Number: 58120 Lot Number: 031523 Description: 031526 Expiration Date: 031526 Recommended Storage: Ambient (2 Nominal Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Compound 1. Calcium carbonate (Ca)	2.0E4 1.0E4 3.0E4 5.0E4 2.5E4	T.OES 1.0ES 5.0E4 m/2-> 2 m/2-> 2 Part # 58120 Lot # 031523

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

Certified Reference Material CRM



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

	<0.02	3	<0.02	ĥ	<0.02	Hf	<0.02	Ц	<0.02	z	<0.02	Ł	<0.02	ŝ	<0.2	£	<0.02	×	<0.02
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	≤0.02	გ	<u>60.02</u>	ප්	40.02	3	0.02	Mo	<0.02	æ	<0.02	Sn	<0.02	S	<0.02	Sn	<0.02	Ŋ	<0.02
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Physical Characterization:

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Part # 58120 Lot # 031523

ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	031523	on ttached pg.) NIST LD50 SRM ont-rat >2000mo/kg 3109a	Ő	O O N
ANA	Ped X Gio	SDS Information (Solvent Safety Info. On Attached pg.) CSHA PEL (TWA) LD5C C	-0 0	190
MUXCITI	Formulated By: Reviewed By:	Expanded Uncertainty +/- (µg/mL) CAS: 20.0 471-34	Q R	170
120		Actual Actual Weight (g) Conc. (ug/mL) 75.2093 10001.4	So	1900 1900 1900
Certified Reference Material CRM	Lot # Solvent: 21110221 2% 60.0 (mL) Uncertainty sentainty	Uncertainty Assay Target Purity (%) (%) Weight (g) 0.10 38.9 75.1990	0.D# [Count] [Line	140 150 240 250
NV5497	5E-05 Balance 00.41 0.058 Flask Un	Nominal Purity Uncertainty Conc. (<i>ug/m</i> L) (%) Purity (%) 10000 99.999 0.10	30 30 30 30 30 30 30 30 30 30 30 30 30 3	- 30 5 7 30 7 30 7 30
	58120 031523 031526 031526 Ambient (20 10000 6UTB 6UTB 6UTB	Lot A RM# Number Con	10 To 1 12	220
Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part Number: 58120 Lot Number: 031523 Description: 031526 Expiration Date: 031526 Recommended Storage: Ambient (2 Nominal Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Compound 1. Calcium carbonate (Ca)	2.0E4 1.0E4 3.0E4 5.0E4 2.5E4	T.OES 1.0ES 5.0E4 m/2-> 2 m/2-> 2 Part # 58120 Lot # 031523

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

Certified Reference Material CRM



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

	<0.02	3	<0.02	ĥ	<0.02	Hf	<0.02	Ц	<0.02	z	<0.02	Ł	<0.02	ŝ	<0.2	£	<0.02	×	<0.02
_	<0.02	లి	٣	固	40.02	Bo	40.02	3	<u>60.05</u>	ź	<0.02	Se	<0.02	ŝ	<0.02	Te	<0.02	Þ	40.02
	40 12	ථ	40.02	a	40.02	h	<0.02	Mg	±0.01	ő	6 0.02	2	<0.02	Ag	<0.02	F	<0.02	>	<0.02
_	€0.05	ඊ	<0.02	3	40.02	놰	<0.02	Å	€0.02	æ	<0.02	å	<0.02	Na	<0.2	Ę	<0.02	ይ	40.02
	<0.01	q	<0.02	g	40.02	Ę	402	Hg	<0.2	۵.	<0.02	Ru	<0.02	S	€0.02	Ę	<0.02	×	<0.02
	≤0.02	გ	<u>60.02</u>	ප්	40.02	3	0.02	Mo	<0.02	æ	<0.02	Sn	<0.02	S	<0.02	Sn	<0.02	Ŋ	<0.02
	≤0.02	ð	<u>60.05</u>	Au	000	£	<0.02	PN	<u>40.02</u>	Å	40.2	ŝ	<0.02	T.	≤0.02	Ę	<0.02	2	2002

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Part # 58120 Lot # 031523

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com				Certified R	Certified Reference Material CRM	aterial CRI	R 103/17	H/2		AN AF https	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	Accredited ate Number ndards.com
CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description:	r: <u>57182</u> rr: <u>061522</u> n: <u>Lead (Pb</u>)	-		Solvent:	Lot # It: 20510011	Nitric Acid		Lievannie	/ nui E	apertite		
Expiration Date:061525Recommended Storage:Ambient (2)Nominal Concentration (ug/mL):10000NIST Test Number:6UTBWeight shown below was diluted to (mL):	e: 061525 e: Ambient (20 °C)): 10000 n: 6UTB rs diluted to (mL): 20	0 °C) 2000.02	5E-05 B 0.058 F	2% 5E-05 Balance Uncertainty 0.058 Flask Uncertainty	2% 40.0 mty (mL)	Nitric Acid		Formulated By:		Giovanní Esposito	061522	য় য
Compound	Lot RM# : Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Assay Purity (%) (%)	ay Target) Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL) C	Solvent S CAS# 0S	SDS information (Solvent Safety Info. On Attached pg.) COHA PEL (TWA)	tion Attached pg.) LD50	NIST
1. Lead(II) nitrate (Pb)	IN029 PBD122016A1	10000	99,999	0.10 62.5	5 32.0006		10001.1		φ	0.05 ma/m3	introne	
[1] Speci	[1] Spectrum No.1 [17.284 s	90]:58	85.D#	17.284 sec]:58182.D# [Count] [Linear]	(upe						11
ສ ອ ອ												
2.0E6	20	O.		40	80	Co	20	Ö Ø	0	*	100	
1.0E6												
rn/z->	110	130		140	150	160	170	180		0	002	
ы С. С. Ш. С.												
R A E	210 220	530		N 0	250	260						
Part # 57182 Lot # 061522					1 of 2				Printed: 3	Printed: 3/16/2023, 1:45:32 PM	45:32 PM	

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



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

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

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02 ₹07	` 	đ	<0.02	9	0.02	Mg	<0.01	ő	<0.02	4a	<0.02	Åø	2007	F	200	1	Ş
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							70.00	4	10	20	20.02	13		q	8.U2	3	808

Physical Characterization:

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

In P M.

Certified by:

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Part # 57182 Lot # 061522

CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

CERTIFICATE OF ANALYSIS

Date: 8/3/2022

M5631 M5632 M5633 M5634 Lot No 820803

Hydrogen Peroxide, ACS Reagent Grade

TEST	MAXIMUM LIMITS	RESULT
Appearance	Colorless and free from suspended matter or sediment	Pass
Assay	29-32%	31.4%
Color (APHA)	10	5
Residue after Evaporation	0.002%	.0001%
Titratable Acid	0.0006 meq/g	< .0006 meq/g
Chloride (Cl)	2 ppm	< 1 ppm
Nitrate (NO ₃)	2 ppm	< 1 ppm
Phosphate	2 ppm	< 1 ppm
Sulfate (SO ₄)	5 ppm	< .5 ppm
Ammonium (NH4)	5 ppm	< 1 ppm
Heavy Metals (as Pb)	1 ppm	< .1 ppm
lron (Fe)	0.5 ppm	< .1 ppm
Sodium Stannate	200 – 300 ppb	Pass

***Our Hydrogen Peroxide is considered un-stabilized because it is very slightly stabilized with Sodium Stannate, 500 ppb maximum, just for safety purposes.

Date of MFG: 8/2022 Retest date: 8/2024

Gína M. Rambo Office Manager

CORCO CHEMICAL CORPORATION. 299 CEDAR LANE. FAIRLESS HILLS, PA 19030. 215-295-5006. FAX 215-295-0781

m/z->	N.5 6	m/z-≯ 5.0E5	ភ. ០ ពេទ្ធ	m/z-> 1.0≣6	5000	1.0트4	1. Chromium(III) nitrate nonahydrate (Cr)	Compound	Volume sho	Expiration Date: Recommended Storage: Nominal Concentration (ug/mL):	Par De	CERTIFIED WEIGHT REPORT:	www.absolutestandards.com
N 10		110		1		[1] Spectrum No.1		Pa	Volume shown below was diluted to (mL):	Expiration Date: nended Storage: ntration (µg/mL):	Part Number: Lot Number: Description:	0	3
220		120		N. O		-	58124 071122	Part Lot Number Number	filuted to (mL):	060526 Ambient (20 °C) 1000	<u>58024</u> 060523 Chromium (Cr)		A
230		130		ů. O		31,393 80	0.1000	Dilution Factor	2000.02		1 (Cr)		MS
240		140				c]:57024.	200.0 0.084	Initial Uncertainty Vol. (mL) Pipette (mL)	0.058 Flask U				MS658
				ð.		31,393 sec]:57024.D# [Count] [Línear]	084 1000	Uncertainty Nominal Pipetta (mL) Conc. (µg/mL)	Flask Uncertainty		21110221 2.0%	Lot #) A
N 50		1 の の		S		t] [Linear]	10 10000.1	nał Initial g/mL) Conc. (µg/mL)		(mL)	221 Nitric Acid % 40.0	# Solvent:	
200		160		0		ş	0.1 1000.0	al Final rg/mL) Conc. (µg/mL)		Ľ	Acid .0 Nitric Acid	ent:	123
		170		70			0.0 2.2	Expanded al Uncertainty ig/mL) +/- (µg/mL)	Lineviewed by.	X	Acid Formulated By:		1
		180		8- 0-		1	7789-02-8) CAS		a la	Horner		
		190		Ŷ				jolvent Os		ten	Lawrence Barry		Y
		20- 00-		100			0.5 mg(Cr)/m3 ort-	SDS Information nt Safety Info. On Attac OSHA PEL (TWA)		Ø	nce Barry		AH-15: https://Ab
		0		o			ort-rat 3250 mg/kg	ched pg.) LDS0	00000	00050	060523		AH-1539 Certificate Number https://Absolutestandards.com
							g 3112a	NIST		٥ <u> </u>	[ω]	1	te Numbe dards.com

Part # 58024 Lot # 060523

1 of 2

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Absolute Standards, Inc. Certified Reference 800-368-1131 Image: Certified Reference www.absolutestandards.com Image: Certified Reference Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	andards.cor	s by Indu	ictive	y Coupled	Plasn	na Mass S	Spectr C	Certified Reference Material Ci	ICP-M	IS):	ateria	I CRM					¥	크	ANAB AR-11 ttps:///	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	034 Acc lificate N standar	lumbe ds.corr
the stype of the style						Trace N	Metals	s Verification	ation	হ	ICP-MS		/g/mL)									
AI <0.02		40,02	Dv	40.02	H	<0.02	E	40.02	- N	- -	20		A) 02	8	a)	-	-			3		
		40.02	Er Dy	<0.02	Ho	<0.02	달드	4)02 4)02	N N	A0.02	88	~ 7	40.02 0.02	<u>8</u> %	40.02 00.02	ਜ ਸ	4 4	c ¥		<0.02		
	_	<0.02	말	<0.02	5	<0.02	Mg	<0.01	² 0	<0.02	.02	Rh	40.02	Ag	<0.02	1	<0.02			<0.02		
Ba 40.02	ନ ଜ	-T -T	ନ୍ଦ୍ର ହ	A 0.02	₹ ¹ =="	4. 6. B	H. Ma	A. A.	p Pd	A A 3 3	38	장	A A 3 3	ç N	A A 1	13	A.2	4 15		0.02 0		
		40.02	2 ଜ ା	40.02	323	4 4 A	N M ;	8 8 8	× 77 ·	A 40 12	រ ន រ	Sc Sm	40.02 2002	Ta s	4 4 A A	11 S 🔒						
								(T)=	(T)= Target analyte	anatyte												
Physical Characterization:	aracteriz	ation:															C	Certified by:	by:		a	
Homogeneity: No heterogeneity was observed in the preparation of this standard.	No heteroge	meity was o	observe	d in the preps	aration (of this stand	lard.										1	14	1		ľ	
 * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). 	ad value is ds, 18.2 n ation of all are prepar are prepar are certife ds should ds should ent Result.	he conc megohm d Ill standarc are me ars are me are are are me ars are me ars are me ars are me ars are me ars are me are are are me are are are me are	entrat leioniz ls. sticulou etrica .5% of .5% of .5	ed water, c ed water, c usly cleane ully using ba f the state f the state f the state and Kuyat, a Note 122	ted fro calibrat d prior alanced d value and un and un 97, U.S	red Class, ted Class, that are that are that are der appro Guideline Guideline	A glass A glass calibra priate s for E nent P	nd volume sware and ited with ites stated laborator, ivaluating vinting Off	the hi weight cond y cond fice, W	ighest p ighest p is trace itions. xpressir /ashingt	ments ourity able tr able the ton, D.	unless raw m raw m NIST 0 NIST 0. C. (19	materials are used in Materials are used in ST (see above). ertainty of NIST 1994).	se stat re usec vve). NIST	n .							

Part # 58024 Lot # 060523

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT:		Ex	Recommended Storage: Nominal Concentration (µg/mL):	NIST	Volume s	Compound	1. Copper(II) nitrate trihydrate (Cu)	1.0E8	5.0E5	m/z->	2.5E7	m/z-≻ 2.0€7	1.0€7	m/z->
om as, Inc.		Part Number: Lot Number: Description:	Expiration Date:	Recommended Storage: Concentration (µg/mL):	NIST Test Number:	Volume shown below was diluted to (mL):	z				10		110		2
-		58029 102523 Copper (Cu)	102526	Ambient (20 °C) 1000	6UTB	t diluted to (mL)	Part Lot Number Number	58129 100223			N		120		
		(Cu)		20 °C)		2000.02	Dilution Factor	0.1000			30		130		
Certif					5E-05 Balance	0.058 Flask U	Initial Uncertainty Vol. (mL) Pipette (mL)	200.0 0.084			4°		140		
ified Referen M569子	Lot #	24002546	2.0%		Balance Uncertainty	Flask Uncertainty	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)	84 1000			50		150		
Certified Reference Material CRM M 56 G子 R いり0/2	Solve	46 Nitric Acid	40.0 (mL)				Initial nL) Conc. (µg/mL)	10000.1			80		0 160		
1 CRM 10 27 23		L	Nitric Acid				Final L) Conc. (µg/mL)	1000.0	894	ting and a state and a state of a	paine dissipsion of the design		0 170		
			Formulated By:	Mg .	Reviewed By:		cxpanoed Uncertainty +/- (µg/mL)	2.2			70				
-		and and a second		to the	-70		(Solven CAS# C	10031-43-3			8 0		180		
http:			Benson Chan	and a	Pedro L. Rentas		(Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	1 mg/m3			90		190		
ANAB ISO 17034 Accreditec AR-1539 Certificate Number https://Absolutestandards.com			102523	,	102523		Attached pg.)	ori-rat 794 mg/kg			100		N 0		
Accredite ate Numbe Idards.com	4		23		ដ្រ		NIST	3114							

www.absolutestandards.com 300-368-1131 Absolute Standards, Inc.



Certified Reference Material CRM



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

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

Γ							Trace M	etals	; Verifica	ition	by ICP-N	r) SI	g/mL)						
	3	2	22	7	2		2	and the second		Sale Con	Constraint for the		Sector Sector Sector	Maria	Contraction of the other				The second second
A	40.02	8	20,02	Dy	<0.02	Hf	<0.02	5	<0.02	N	<0.02	Pr	<0.02	Se.	<0.2	5	<0.02	W	<0.02
SB	40.02	ß	<0.2	Ę	<0.02	Ho	<0.02	Ŀ	<0.02	ß	<0.02	Re	<0.02	2	<0.02	ī	<0.02	c	<0.02
As	40.2	ů	<0.02	F	<0.02	F	<0.02	Mg	<0.01	õ	A0.02	Rb	A0.02	Ag	40.02	3	40.02	<	4002
Ba	<0.02	S	<0.02	ନ୍ଥ	<0.02	5	40.02	Mb	<0.02	Pd	<0.02	Rb	A).02	Na	40 i2	J	<0.02	\$	40.02
Be	<0.01	ዮ	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	'n	<0.02	Ru	<0.02	Sr	40.02	j	<0.02	ĸ	40.02
Bi	<0.02	S	<0.02	ĉ	<0.02	La	40.02	Mo	<0.02	¥	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	2	40.02
œ	<0,02	ß	-1	Au	<0.02	3	<0.02	Nd	<0.02	ĸ	<0.2	8	<0.02	Ta	<0.02	H	<0.02	2	40.02

(T) = Target analyte

Physical Characterization:

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

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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).

urt # 58029 Lot # 102523

800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT:		ņ		Recommended Storage: Nominal Concentration (µg/mL):	NIST	Volume		Compound	1. Manganese(II) nitrate tetrahydrate (Mn)	Сл. О ПП Ф	2.5E8	M /2-2	1.008	5.OM7	™/z-> 1.0E8	5.067	m/z->
om	Ð	Part Number: Lot Number: Description:	niration Data.	Expiration Date.	<pre>Hecommended Storage: Concentration (µg/mL):</pre>	NIST Test Number:	Volume shown below was diluted to (mL):		Nu		[1] Speatrum No.1		10			-1 -1-0		
		<u>58025</u> 102623 Manganese (Mn)	100606	Ambiant (on t	Ampient (20 °C) 1000	6UTB	diluted to (mL):	Part Lot	r z	58125 071123	-		20			ן מ ס		
		(Mn)		2	C)	5E-05	3000.41 0.058	Dilution		0.1000 300.0	34.243 sec]:57025.D# [Count] [Linear]		30			130		
Certified Re M5648						05 Balance Uncertainty	58 Flask Uncertainty	lal Uncertainty	Pipette (mL)	0.084	7025,D# [C		40			140		
ference A	Lot #	24002546	2.0%			ainty	ł	Nominal	Ē	1000	ount] [Lines		0			150		
Material CRM	Solvent:	Nitric Acid		(1112)				Initial	m	10000.1 10	ŗ		0			1e0		
			Nitric Acid Formulated By:		X	Reviewed By:		Expanded Final Lincertainty	(mL)	1000.0 2.1			0			170		
			ted By:	0	ed to	ed By:) CAS	20694-39-7			9 0			180		
http		Contraction of the second seco	Benson Chan	Y	tento	Pedro L. Rentas		(Solvent Safety Info. On Attached no.)	OSHA PEL (TWA)	7 5 mg/m3			80			190		
AR-1539 Certificate Number https://Absolutestandards.com		,	102623		/	102623		nation On Attached no.)	A) LD50	ort-rat >300mg/kg			100			200		
e Numbe						لت	.,	NIST	SRM	3132								

Part # 58025 Lot # 102623

1 of 2

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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):

202	r,	40.02	3	40.02	Ta	<0.02	s	<0.2	ĸ	<0.02	Nd	40.02	РЪ	40.02	Au	<0.02	ß	40.02	₿
20.02	Zn	<0.02	S	40.02	s	<0.02	Sm	40.02	¥	<0.02	Mo	<0.02	La	<0.02	ĉ	<0.02	S	40.02	Bi
<0.02	Y	<0.02	Tæ	<0.02	ş	<0.02	Ru	<0.02	q	<0.2	Нg	40.2	Fe	<0.02	G	<0.02	Ω	<0.01	Be
40,02	41	<0.02	Th	40.2	Na	<0.02	Rb	<0.02	Pd	Ч	Mn	<0.02	. F	<0.02	ନ୍ଥ	<0.02	S	<0.02	Ba
40.02	<	<0.02	H	<0.02	Ag	<0.02	8	<0.02	8	40.01	Mg	<0.02	In	<0.02	臣	<0.02	ĉ	A0.2	As
40.02	٩	<0.02	Te	A0.02	S	<0.02	Re	<0.02	Ŋ	40.02	Ŀ	<0.02	Ho	<0.02	Ę	<0.2	ß	40.02	SP
40.02	W	<0.02	1	<0.2	8	<0.02	P	<0.02	N	<0.02	Ľ	<0.02	Hŕ	<0.02	Dy	<0.02	ß	A0.02	A
					Section 1995	A State of the sta	ALC: NO.	A PARTY AND AND AND		Store Manager	State State								100
								DY ICP-N		verifica	etais	I race M							

(T) = Target analyte

Physical Characterization:

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

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Certified by:

* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the balances that are calibrated with weights traceable to NIST (see above). * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

* 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).

art # 58025 Lot # 102623

2 of 2

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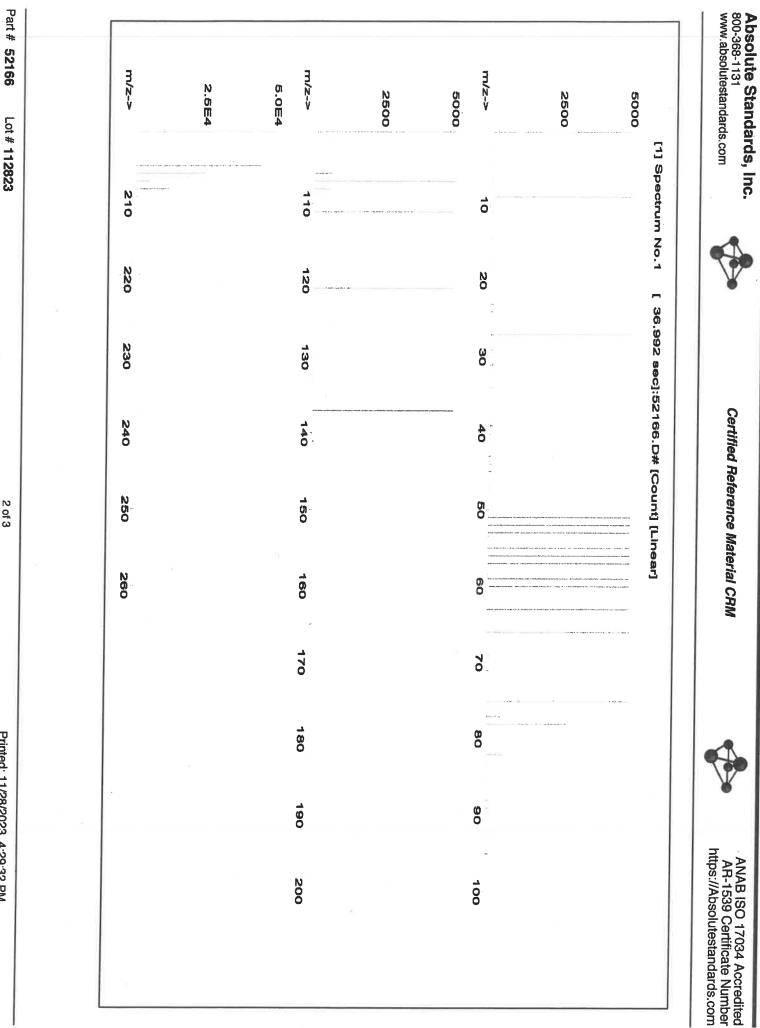
m/z->		2.0E6	m/z->	0.0 П 14	1.0E5	m/z->	0, 0 11 12 12 12 12 12 12 12 12 12 12 12 12	1.005	1. Lead(II) nitrate (Pb)	Compound	Weight sho	NIST 1	Recommended Storage: Nominal Concentration (µg/mL):	Exc		CERTIFIED WEIGHT REPORT:	ADSOIUTE Standards, Inc. 800-368-1131 www.absolutestandards.com
21 0 220 0			110 120			10 20		[1] Spectrum No.1 [14	IN029 PBD122016A1	Lot M RM# Number Conc	s diluted to (mL):	NIST Test Number: 6UTB		Expiration Date: 100926	Lot Number: 100923 Description: Lead (Pb)		om
230			130 140			30 40		14.144 sec]:58082.D# [Count] [Linear]	1000 93.999 0.10 62.5	Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%) V	3000.41 0.06 Flask Uncertainty	5E-05 Balance Uncertainty		2%			Certified Referenc R ÷ 12/20[を3
250 260			150 160 170			50 60 70		tj [Linear]	4.80071 4.80077 1000.0	Target Actual Actual Weight (g) Weight (g) Conc. (µg/mL)			(111)	60.0 Nitric Acid	46 NITHC ACID		Certified Reference Material CRM こして、20123 Mらそれチ
			0 180 190			80 00			2.0 10099-74-8 0.05 mg/m3	Expanded SDS Informa Uncertainty (Solvent Safety Info. On +/- (µg/mL) CAS# OSHA PEL (TWA)		Reviewed By: Pedro L. Rentas	Kerten Hen	Formulated By: Lawrence Barry	Admine By		*
			2000			100			m3 intrvns-rat 83 mg/kg 3128	SDS Information (Solvent Safety Info. On Attached pg.) NIST # OSHA PEL (TWA) LD50 SRM		tas 100923	Ø	ny 100923	\¥		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

	DELL-10205000					2 of 2							00923	Lot # 100923		Part # 57082
		are used in ove). NIST	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 standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).	ity raw the to Ni the Unc. (The certified value is the concentration calculated from gravimetric and volumetric measurements Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity 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 t 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 Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D	netric d the d. g and I g ffice, V	and volur assware ar vrated with wise state te laborate Printing C Printing C	s A gli re califi ropria nes foi nment	or to use. S. Gover S. Gover	ated f calibr valance t and c t, C.E. 297, U	tion calcu ed water usly clear ally using f the stat and Kuya al Note 1; al Note 1;	sentrat deioniz deioniz deioniz deioniz echnic c, B.N. h S.% o c, B.N. h i. S.% o c, B.N.h h i. S.% o c, B.N.h h h i. S.% o c, B.N.h h h h h h h h h h h h h h h h h h h	The certified value is the concentration calculated from gravimetric and volume Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with w Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating a Measurement Result," NIST Technical Note 1297, U.S. Government Printing Offi	value i ion of a contain e prepa e certif keferen t Result t Result	certified preparat landard a dards ar dards ar tandards tandards suremen suremen	* The * Purifi * Stan * Stan Mea
P. S.	for the second s							ındard.	1 of this sta	paratio	xd in the pre	observe	Homogeneity: No heterogeneity was observed in the preparation of this standard.	o heterog	encity: N	Homog
Certified by:	ې ک				Vte	get anal	(T)= Target analyte						zation:	racteri	Physical Characterization:	Physi
W 40.02 V 40.02 Yb 40.02 Yb 40.02 Zn 40.02 Zn 40.02 Zn 40.02 Zn 40.02	Ть Алл 11 Алл	e 40.2 g 40.02 a 40.02 a 40.02 a 40.02 a 40.02 a 40.02 a 40.02	40.02 Se 40.02 Si 40.02 Ag 40.02 Ag 40.02 Na 40.02 Na 40.02 Si	Rb Sm Sm	40.02 40.02 40.02 40.02 40.02	P P R P	40.02 40.02 40.02 40.02 40.02	Hg Mg	- 40.02 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7	요 한 않 날 막 発 표	40.02 40.020	~ Co Co Co 또 편 것	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	5	40.02 40.02 40.02 40.02 40.02	Al Sb Ba Bi Bi
			(µg/mL)		by ICP-MS		Verification	Metals	Trace M							
					MS):	(ICP-	trometry	s Spe	sma Mas	ed Pla	ly Couple	uctive	Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	Analy	umental	Instru
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com				CRM	Certified Reference Material C	erenc	tified Re	Ce					s, Inc.	ards.co	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	w.absolut

Part # 52166 Lot # 112823

1 of 3

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The c Purifie the purifie All stand All stand Uncer Measu		lomoge	Physical Characterization:	<u>888888888888888888888888888888888888</u>		ADSOLUTE Standards, 800-366-1131 www.absolutestandards.com	
ertified acids reparat indard ar ards ar ards ar indards ar tainty f		neity: N	al Cha	40.02 10 10 10 10 10 10 10 10 10 10 10 10 10		nental	?
value i ion of a contain e prepa e certif shoulc t Resul		o heteroj	racteri	58558 58558		Analy	
The certified value is the concen Purified acids, 18.2 megohm dei the preparation of all standards. All standard containers are meti Standards are prepared gravime Standards are certifed (+/-) 0.5 All standards should be stored w Uncertainty Reference: Taylor, E Measurement Result," NIST Tech		geneity v	zation			Standards, Inc. astandards.com	
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The certified value is the concentration calculated from gravi Purified acids, 18.2 megohm deionized water, calibrated Class the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that ar Standards are certifed (+/-) 0.5% of the stated value, unless All standards should be stored with caps tight and under app Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelir Measurement Result," NIST Technical Note 1297, U.S. Govern		Homogeneity: No heterogeneity was observed in the preparation of this standard.			race I		
 * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). 		ndard.		Mo Hg Mg L L	Trace Metals Verification by ICP-MS (µg)	Solute Standards, Inc. 368-1131 v.absolutestandards.com	
and voi ssware ssware wise sta e labora Evaluat Evaluat					Verif	Certified Reference Material CRM	
and th and th ith wei ith wei ing and ing and			(T) = Ti		ication	1 Refe	
c meas e highe ghts tr ghts tr d Expre d Expre			(T) = Target analyte	K P P Z OS NN	h by I	rence	
uremer st purit aceable ns. ns. rssing t			alyte	- A 0,02 A 0,02	P-MS	Materi	
nts unk ty raw ty raw be to Nis				Sc S	(µg/	al CRI	
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						ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	

Part # 52166 Lot # 112823

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Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	M	M5768 [M5769 (64) Certified Reference Material	ce Material CRM	42/s	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description:	<u>58112</u> 091823 Magneslum (Mg)	Solvent: 24	Lot # 24002546 Nitric Acid	Advenue	Or -
Expiration Date: 091826 Recommended Storage: Ambient (Nominal Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	20 °C)		(mL) (mL) (BF) $R - \frac{1}{3}/2\phi$	Formulated By: Heviewed By:	Lawrence Barry 091823 Pedro L. Rentas 091823
Compound	Lot Nominal I RM# Number Conc. (µg/mL)	Purity Uncertainty Assay T (%) Purity (%) (%) We	Target Actual Actual Weight (g) Weight (g) Conc. (vg/mL)	Expanded Uncertainty +/- (µg/mL) CAS	SDS Information (Solvent Safety Info. On Attached pg.) NIST # OSHA PEL (TWA) LDSO SRM
1. Magnesium nitrate hexahydrate (Mg) IN030 маюзаал	10000	99.999 0.10 8.51 23		20.0 13446-1	ng/kg 3
[1] Spectrum No.1 1.0E6		[19.923 sec]:58112.D# [Count] [Linear]	[Linear]		
а. О Ща С					
m/z-> 10	20	8	ø	70 80	90 100
1000 -		·		4	
₩/z->	120 130	140	150 160	170 180 1	190
1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0					
Part # 58112 Lot # 091823		-	1 of 2	Drintod	Drintod- 10/00/0000 0.56-15 DM

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Certified Reference Material CRM



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

Γ							Trace Mo	etals	Verifica	tion	by ICP-N	IS (µ	g/mL)						
									1100 100 100 100					100	The second second				
A	<0.02	8	<0.02	Dy	<0.02	Hf	<0.02	5	<0.02	Ni	<0.02	Ŗ	<0.02	Se	40.2	qI.	<0.02	W	<0.02
SP	<0.02	G	<0.2	E.	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	ŝ	<0.02	Te	<0.02	d	<0.02
As	<0.2	ĉ	<0.02	E	<0.02	In	<0.02	Mg]	SO	<0.02	Rh	<0.02	Ag	<0.02	H	<0.02	V	40.02
Ba	<0.02	S	<0.02	ନୁ	<0.02	F	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Ъ	<0.02	Υb	<0.02
Ве	<0.01	Ŷ	<0.02	Ga	<0.02	Fe	40.2	Hg	<0.2	٩	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	ĸ	<0.02
B	<0.02	S	<0.02	Ģ	<0.02	La	<0.02	Mo	<0.02	Ŗ	<0.02	Sm	<0.02	ŝ	<0.02	Sn	<0.02	6	<0.02
5	40.02	ç	40.02	Au	<0.02	P	<0.02	Nd	<0.02	ĸ	<0.2	S.	<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:

* 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).

Part # 58112 Lot # 091823



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							Trace M	letals	Verification	ition	by ICP-MS		(ng/mL)							_
		and the second se	A CONTRACTOR OF A CONTRACTOR					All and the	TANK ALL STATE	The second s	ALL DESCRIPTION OF THE OWNER OF T	Nonese and			and the second second second				A CONTRACTOR OF A CONTRACT	10
A	<0.02	3	<0.02	à	<0.02	Hf	<0.02	ГI	<0.02	N	<0.02	Ł	<0.02	Se	<0.2	Trb	<0.02	M	<0.02	-
Sb	<0.02	J	40.2	固	<0.02	Ho	≤0.02	2	<0.02	£	<0.02	Re	<0.02	S	<0.02	Pe L	40.02	D	<0.02	_
As	<02	ඊ	<0.02	Eu	40.02	ч	40.02	Mg	10.0>	ő	<0.02	Rh	<0.02	Ag	<0.02	F	≤0.02	>	<0.02	-
Ba	<0.02	ű	<0.02	3	40.02	Ц	40.02	Mn	<0.02	P	€0.02	£	<0.02	Ra	40 12	đ	<0.02	\$	<0.02	-
Be	T	Ċ	0.02	G	<0.02	e.	<02	Hg	<02	۵.	<0.02	Ru	≤0.02	2	<0.02	μ	<0.02	7	<0.02	-
Ä	<0.02	රී	<0.0≥	පී	<0.02	r.	<0.02	Mo	<0.02	đ,	40.02	Sm	≤0.02	s	<0.02	Sn	<0.02	Za	<0.02	-
æ	<0.02	ð	<0.02	Au	<0.02	£	40.02	PN	<0.02	М	<0.2	ŝ	<0.02	Ta	<0.02	F	<0.02	2	40.02	_
									(T) = Tarr	get analy	yte									1

Physical Characterization:

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

Certified by:

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Part # 57050 Lot #	m/z->	N.01 M.4	m/2->-	1.0E5	177/2-> 2.0E5	N G M G	8. 0 11 15	1. Ammonium hexatluorostannate(IV) (Sn)	Compound	Expiration Date: Recommended Storage: Nominal Concentration (ug/mL): NIST Test Number: Weight shown below w	<u>CERTIFIED WEIGHT REPORT</u> Part N Lot N Desc	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
Lot # 071123	210		110 120		0 No		[1] Spectrum No.1	(W) (Sn) INO10 SND042023A1	Lot RM# Number	Expiration Date: 071126 Pecommended Storage: Ambient (20 °C) Concentration (µg/mL): 1000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):	<u>PORT:</u> Part Number: <u>57050</u> Lot Number: <u>071123</u> Description: <u>Tin (Sn)</u>	s.com
	230		130		e e		[15.034 sec]:	1000	Nominal Conc. (µg/mL)	0 °C) 499.93	2	V
	20		140		ð		15.034 sec]:58150.D# [Count] [Linear]	99.999 0.10 44.2	Purity Uncertainty Assay (%) Purity (%) (%)	5E-05 Balance Uncertainty 0.058 Flask Uncertainty	Solvents:	Certifi
	N30 260		150 160		8		unt) [Linear]	1.13107	r Target Actual Weight (g) Weight (g)	(mL)	Lot # 21110221 22D0562008	Certified Reference Material
			170		70			1001.6	Actual Conc. (µg/mL)	ric acid	ric acid	CRM
			180		80			16919-	Expanded Uncertainty (Solv +/- (µg/mL) CAS#	Formulated By:		PPGP M
			190 200		90 100			7 mg/m3	SDS Information (Solvent Safety Info. On Attached pg.))# OSHA PEL (TWA) LD50	Benson Chan		R
			0		ŏ			ω	on tached pg.) NIST LD50 SRM	071123 - 071123		ANAB ISC AR-1539 (https://Abso
												ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	•	Cei	Certified Reference Material CRM	ial CRM		ANAB ISO 17034 Accredited
www.absolutestandards.com	5				V	AR-1539 Certificate Number https://Absolutestandards.com
Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	ductively Coupled	Plasma Mass Spec	trometry (ICP-MS):			
		Trace Metals	Is Verification by ICP-MS	P-MS (µg/mL)		
AI <0.02 Cd <0.02	Dy <0.02	4003				
A)2 C C		2 2 2 2 2 2 2	40.02 Ni		Se <0.2 Tb Si <0.02 Te	40.02 W 40.02
2 2 2 2 2 2 2 2			<0.01 Os <0.02 Pd	Rb Rb		\$ < c
	Ge 40.02	Fe 40.2 Hg	40.2 P 40.02 Pt	Ru Sm		_
			(T) = Target	4	ZITAS	<0.02 Zr <0.02
Physical Characterization:						Certified by:
Homogeneity: No heterogeneity was observed in the preparation of this standard.	observed in the prepa	ration of this standard.				//
ŝ	9,					mr P All
		:			20	
					÷	
 * 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 politoriated with using balances. 	centration calculat deionized water, ca ds. eticulously cleaned	d from gravimetric librated Class A gla prior to use.	and volumetric measurer ssware and the highest p	nents unless otherwise stated. writy raw materials are used in	ie stated. 'e used in	

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
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Part # 57050 Lot # 071123

2 of 2

Printed: 2/8/2024, 5:01:38 PM

redited Jumber ds.com	NIST SRM	3113		
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	Formulated By: Lawrence Barry 091923 Formulated By: Lawrence Barry 091923 Reviewed By: Pedro L. Rentas 091923 Expanded SDS Information Uncertainty (Solvent Safety Info. On Attached pg.) N +/- (ug/mL) CAS# 0SHA PEL (TWA) LD50 S	ng/kg	180 B0 190 200 200 200	Printed: 2/8/2024, 5:01:14 PM
AM I'U (fru (Nitric Acid	1000.0		
Certified Reference Material CRM 02109124	Solvent: Nttric Acid 40.0 (mL) httal bittal Conc. (ug/mL)	10000.0		
artified Réference l 0 2 0 9 1 2 4	Lot # C 24002546 2.0% 2.0% Nominat Nominat Conc. (rg/mL)	1000	34.243 eec]:58027.D# [Count] [Linear] 30 40 50 130 140 150 230 240 250	1 of 2
Certified F		0.084	240 240 240	
Å	5E-05 0.058 on Initial or Vol. (mL)	00 200.0	3 eec]:55 230 30 23 130	
	57027 091923 Cobait (Co) 091926 Ambient (20 °C) 1000 6UTB 6UTB 6UTB d to (mL): 2000.02 Lot Dilution Lot Dilution	23 0.1000		
	57027 091923 Cobalt (Cobalt (Ambient Ambient 1000 6UTB ss diluted to (mL Part Lot	58127 050923		
Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Cobait (C Cobait (C 091926 Recommended Storage: Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): COTB NIST Test Number: COTB CODB	1. Cobatt(II) nitrate hexahydrate (Co) 58		<pre>Part # 57027 Lot # 091923</pre>

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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);

L	200	10	2 Contraction	4	2000		400			-		4							
	20.05	3	20.05	5	20.02	Ħ	40.02	3	<0.02	ż	40.02	£	40.02	8	40.2	f	₫.02	M	40.02
_	40.02	లి	4 02	山	€0.02	Ho	40.02	5	<0.02	Ż	<u>40.02</u>	Re	<0.02	3	≤0.02	Te	€0.02	D	<0.02
_	402	ථ	€0.05	圕	40.02	Ч	40'02	Mg	10 ⁰ ⊳	ő	≤0.02	붭	<0.02	Ag	40.02	F	<0.02	Ż	<0.02
_	40.02	చి	≤0.02	ઝ	600	ы	<0.02	Mn	<0.02	P	40,02	ßb	<0.02	Na	40.2	đ	<0.02	Ŗ	<0.02
_	10.05	ບັ	≤0.02	g	20.0 2	ङ	402	Hg	40.2	۵.	€0.02	Ru	<0.02	ي.	≪0.02	Ta	≤0.02	Y	€0.02
_	<0.02	ථ	£-	ö	40.02	Ľ	0 02	Mo	<u>60.02</u>	æ,	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Z	6 .02
_	40.02	ට්	<0.02	Au	40.02	£	40.02	PN	40.02	м	4 02	8	40.02	£	40.02	Ë	40.02	72	2002

Physical Characterization:

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Certified by:

Printed: 2/8/2024, 5:01:04 PM	1 of 2	Part # 57033 Lot # 111323
ő	230 240 250 26	m/z-> 210 220 2
		0 0 0
160 170 180 190 200	130 140 150 1	m/≥-> 110 120 1
		N m 4
80 70 80 100	90 40 50	5.0E4
		- 1 0 0 0 0
	34.433 seo]:57033.D# [Count] [Linear]	[1] Spectrum No.1 [34.433 2.0E5
1000.0 2.0 7440-38-2 0.5 mg/m3 orl-rat	400.0 0.084 1000	1. Arsenic (As) 58133 020522 0.1000
Expanded SDS Information Final Uncertainty (Solvent Safety Info. On Attached pg.) <u>nL) Conc. (ug/mL) +/- (ug/mL) CAS</u> # OSHA PEL (TWA) LD50	11	Part Lot Dilution Compound Number Number Factor
Reviewed By: Pedro L. Rentas 111323	0.06 Flask Uncertainty	Volume shown below was diluted to (mL): 4000.0
Hedre Fenter		
Id Acid Formulated By: Lawrence Barry 111992	24002546 Nitric Acid 2.0% 80.0	Description: <u>Arsenic (As)</u>
п (Lot # Solvent:	
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	Certified Reference Material CRM	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com

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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):

(T) = Target analyte

Physical Characterization:

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

Low P. S.

Certified by:

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

Part # 57033 Lot # 111323

$\begin{array}{c c c c c c c c c c c c c c c c c c c $	m/z->	2500	m/z->	500	m/z->-	2.5 114	5.OE4	1. Ammonium dihydrogen phosphate (P)	Compound	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	CERTIFIED WEIGHT REPORT: Par Lo De	www.absolutestandards.com
R I D 2 M 4 C 1 M 52 15 Interview Lat* Solvent: 2111021 Nitric Acid Provide (P) 2% 40.0 Nitric Acid 2000/2 0.058 Failure inventienty Environmenty 2000/2 0.058 Failure inventienty Environmenty Environmenty Nominia Party Uncertainty Assay Target Actual Actual Commutated By: Perford L Ren 10000 ease 0.10 27.5 72.7287 72.7287 72.7284 10000.0 30.0 772.78-1 5mg/r 12.074 aeoc)15891 16. D/r County (Lineau) Factor Lange Store 5mg/r 30 40 sio eo 70 sio sio sio 30 40 sio read read read read 30 40 sio read read read read read read 30 40 sio read read read	N O		110		10		[1] Spectrum		-	Expiration Date: Recommended Storage: I Concentration (µg/mL): NIST Test Number: Weight shown below was d	DRT: Part Number: Lot Number: Description:	om
RICZINGLA MITELS Bolvent: 21110221 Nitric Acid IDP 2% 40.0 Nitric Acid SEC5 Balance locentary (mL) Nitric Acid Formulated Br. Formulated Br. SEC5 Balance locentary (mL) Nitric Acid Formulated Br. Lawrence Balance (mL) Formulated Br. Lawrence Balance (mL) Formulated Br. Lawrence Balance (mL) Source Status Source 1 100 27.5 72.7289 10000.0 20.0 77.27.951 Soliver Status (Solvent Status Soliver Solitive (Solvent Status 774 500 50 50 70 60 160	2220		120		N. O				Lot Number	041726 Ambient (20 10000 6UTB 6UTB	57115 041723 Phosphore	5
Hric Acid Iric Acid Iric Acid Iric Acid Iric Acid Actual Actual Actual Expanded Expanded Expanded SDS Inf Expanded SDS Inf Solvent Safety Inf eight (g) Conc. (ug/mL) · (AS# OSHA PEL) 2.7289 10000.0 20.0 7722-76-1 5 mg/m 2.7289 10000.0 20.0 7722-76-1 5 mg/m 150 170 180 190 190 190	230		130		ຜ. ວ		2.074 sec]:58			00.02	us (P)	R
Hric Acid Frite Acid Formulated By: Lawrence Ba Formulated By: Pedro L. Ren Expanded Actual Uncertainty (Solvent Safety Inf eight (g) Conc. (ug/mL) - 4/- (ug/mL) CAS# OSHA PEL 2.7289 10000.0 20.0 7722-76-1 5 mg/m 2.7289 10000.0 1722-76-1 5 mg/m 160 170 180 190 190	240		140		4		3115.D# [Cot		Uncertainty Assay Purity (%) (%)	2% Balance Uncertainty Flask Uncertainty	Solvent:	22/09/12
Formulated By: Lawrence Ba Formulated By: Lawrence Ba Reviewed By: Pedro L. Ren Conc. (ug/m), -/- (ug/m), CAS# OSHA PEL 10000.0 20.0 7722-76-1 5 mg/m 10000.0 20.0 7722-76-1 5 mg/m 10000.0 eio eio	250		150		S O		ınt] [Linear]					
Formulated By: Lawrence Ba Formulated By: Pedro L. Ren Expanded SDS Inf Uncertainty (Solvent Safety Inf +/- (ug/mL) CAS# OSHA PEL (20.0 7722-76-1 5 mg/m 20.0 7722-76-1 5 mg/m 20.0 190 90	260							2.7289 10000.	Actual Actual sight (g) Conc. (µg/1	rric Acid	tric Acid	15815
22-76-1 5 mg/m					1			20.0		Formulated B	Q	
o 200			4						SC (Solvent Saf CAS# OSH/	Ped	Gerence /	
.hed pg.) LbS0 LbS0									DS Information fety Info. On Attac A PEL (TWA)	L. Rentas	Jan	https://At
g 3186 SRM			9		J				0	041723 041723		tps://Absolutestandards.com

Abs	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	Stand standard	ards, Is.com	Inc.	~				Ce	tified Re	feren	Certified Reference Material CRM	ial CR	M					https AR	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	4 Accredited ate Number undards.com
н	nstrum	ental A	nalysis	by Ind	uctive	ly Coupl	ed Pla	Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS);	s Spec	troscopy	(ICP-	-MS):									
_								Trace Metals	etals	Verifica	Ition	Verification by ICP-MS	1.00	(µg/mL)							
	A	40.02	22	A .02	Dy	A).02	H	40.02	-	A) (2	N	A)02	7	A.02	8	A 2	ŧ	AB		3	
		A .22	ດ ເ	A 012	ម្មា	40.02	Но	<0.02	L	40.02	NB	<0.02	Re	40.02	<u>8</u>	40.02	Te	40.02	c :	40.02	
	Ba		ନ ଦ	8 8 22	S 5	40.02 00.02	4 5	40.02 20	Mg	40.02 40.02	r S	a a 3	₽ ₽	3 8	Å.	A0.02	† 13	A B B	\$ <	88	
		<0.01	ភ្	40,02	ဌ	40.02	놂	<0.2	Hg	40.2	• •	T	R Q	40.02	8 A	8.8 2		<0.02	₩ '8	40.02 40.02	
		8 8 8 8	<u>ନ</u> ଚ	8 8 2 2	<u> </u>	4 4 8 8	3 C	4 4 A	N M	A A 8 8	× 37	A. 0.02	ŝ	A A 3 S	ų s	88	1 S	A 0.02	2 B	A B B	
										(T)= Ta	(T)= Target analyte	alyte			Ī						
	Physical Characterization:	Chara	teriza	tion:														Cer	Certified by:		
	Iomogene	ity: No ł	leteroger	neity was	observ	ed in the pr	eparatic	Homogeneity: No heterogeneity was observed in the preparation of this standard.	ındard.								ſ	h	1	Ŵ	
* *	The cer Purified the nre	The certified value is the concen Purified acids, 18.2 megohm dei the preparation of all standards	lue is t 8.2 m	the conc egohm c	xentrat deioniz	ion calcul ed water,	ated f	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	metric s A gla	and volu ssware a	metric nd the	measurei highest p	nents ;)urity n	unless oth aw mater	nerwise ials are	e stated. 9 used in					
* * * * *	All stan Standar Standar All Stan Uncerta Measun	dard co ds are p dards sl ldards sl linty Ref ement R	ntainer prepare certifed erence lesult, "	s are me d gravin l (+/-) 0 l (+/-) 0 e stored : Taylou NIST Te	eticulo netrica).5% o d with r, B.N. echnic;	usly clear illy using i f the stat caps tigh and Kuya al Note 1;	hed pri balanc ied val t and i t, C.E. 297, U	 * 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). 	e calib other ropriat nes for nment	rated wit wise stat e laborat Evaluatir Printing (h weig ed. ory co Office,	hts trace nditions. Expressin Washingt	able to og the l	to NIST (see above). e Uncertainty of NIST D.C. (1994).	e abov ty of N	e). IIST					
														·							
Part #			# DA 1	733						U.	2	5					2				
Part #	57115		Lot # 041723	723							2 of 2	f2					Print	Printed: 2/8/2024, 5:01:22 PM	24, 5:0	1:22 PM	

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	-	260	250	240	230		220	210	m/z->
									1.0巨5。
									2.0厘5
180 190 200	170	160	150	140	130	р. 9	120	110	m/z->
									2,5E
									5.0E5
80 90 100	70	eo	50	40	8	magan Raji Anana ya Anany	N	10	m/z->
									1000
		ear)	ount] [Lin	24.004 sec];58116,D# [Count] [Linear]	¢ sec];58	[24.00		[1] Spectrum No.1	2000
20.0 7763-20-2 NA orf-rat 4250mg/kg 3181	10000.1	82,4682	82.4675	0.10 24.3	99,9	10000	IN117 SLBR7225V	IN11	1. Ammonium sulfate (S)
Expanded SDS Information Uncertainty (Solvent Safety Info. On Attached pg.) NIST +/- (ug/mL) CAS# OSHA PEL (TWA) LDSO SRM	(g) Conc. (µg/mL)	Actual Weight (g)	Target Weight (g)	Uncertainty Assay Purity (%) (%)	Purity (%)	Nominal Conc. (µg/mL)	Lot. Number	RM#	Compound
i By: Ped	[F			Balance Uncertainty Flask Uncertainty	0.058	1999.48	led to (mL):	Weight shown below was diluted to (mL):	Weight show
da Terra Barry	1 1					20 °C)	071126 Ambient (20 °C) 10000	Expiration Date: nended Storage: htration (µg/mL):	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):
around Bring	Type 1 Water	ASTM Ty	Lot# 071123	Solvent:		E)	57116 071123 Sulfur (S)	<u>PORT:</u> Part Number: Lot Number: Description:	CERTIFIED WEIGHT REPORT: Part N Lot N Desc
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	CRM		ference M	Certified Reference Material	R a			om	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
								And in case of the local division of the loc	

Acsolute Standards, Inc. 800-368-1131 www.absolutestandards.com			Certified Reference Material CRM	ence Material (CRM			•	ANAB AR-15 https://A	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	uctively Couple	d Plasma Mass S	Spectrometry (I	CP-MS):						
		Trace Me	Metals Verificat	Verification by ICP-MS	VIS (µg/mL)					
AI <0.02 Cd <0.02	Dy <0.02	Hr	-18	NF CAR		ALL TANKS			新学校大学	
4).02 C.				Ni <0.02	Pr <0.02 Re <0.02	Si Se	40.02 20.02	다 다	40,02 U	A A A
	Gd 40.02	In <0.02	Mg <0.01 Mn <0.02	PH 40.02		Ag	A 8.	133		
		Fe 40.2	Hg <0.2 Mo <0.02			n sõ	- 0.02			
	70.02	20105 0.1	ND 20.02	K <0.2		T.a	<0.02	3	40.02 Zr	40.02
ruysical Cnaracterization:				- market				Q	Certified by:	
Homogeneity: No heterogeneity was observed in the preparation of this standard.	bserved in the prep	paration of this standa	ud.							/
							(the second	- K- S	
 The certified value is the concentration calculated from gravimetric and volumetric measurements Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity in the preparation of all standards. All standard containers are maticulated class A glassware and the highest purity in the preparation of all standards. 	Intration calcula Bionized water, (S.	ted from gravime calibrated Class A	tric and volumet glassware and t	ric measuremen he highest purit	ts unless otherwise stated. Y raw materials are used in	wise sta are use	ited. in			
* 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.	etrically using b 5% of the state	alances that are c d value, unless ot	alibrated with we herwise stated.	eights traceable	to NIST (see a	bove).				
* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.	with caps tight B.N. and Kuyat, chnical Note 12	and under approp , C.E., "Guidelines 97, U.S. Governme	riate laboratory (for Evaluating ar ent Printing Offic	conditions. nd Expressing the, Washington,	ne Uncertainty of NIST D.C. (1994).	of NIST				
		3								

2 of 2

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m/z->	បា 0 ៣ ហ	m/z-> 1.0E6	₩Z-> 2.0E6	5000 2500	1. Ammonium hexafluorosilicate (Si)	Weight shown bei	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number:	<u>CERTIFIED WEIGHT REPORT:</u> Part Number: Lot Number: Description:	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
210 220		110 120	o S	[1] Spectrum No.1 [31.:	IN009 SID082022A1	s diluted to (mL): Lot RM# Number	1 Date: 122026 porage: Ambient (20 °C) g/mL): 1000 mber: 6UTB	mber: <u>57014</u> mber: <u>122023</u> ption: <u>Silicon (Si)</u>	ς.
230 240 250		130 140 150	3 0 4 0	31.393 sec]:58014.D# [Count] [Linear]	99.999 0.10 14.4	1999.48 0.058 Flask Uncertainty Nominal Purity Uncertainty Assay Target Conc. (ug/mL) (%) Purity (%) (%) Weight (g)	2% 40.0 (mL)	Lot #	Certified Reference Material CRM
2000		160 170	80	Inear]	13.8855 1000.0	Actual Actual Weight (g) Conc. (ug/mL)	Nitric Acid	Nitric A	Material CRM
		180 190	80 0 0		16919-19-0	Expanded Dy: Fedro L. Hennas Expanded SDS Inform: Uncertainty (Solvent Safety Info. 0) +/- (ug/mL) CAS# OSHA PEL (TWA)		Aleah & Brack	
		2000	100		orl-mus 70 mg/kg	SDS Information SDS Information (Solvent Safety Info. On Attached pg.) NIST AS# 0SHA PEL (TWA) LD50 SRM	<i>v</i>	A.	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

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Certified Reference Material CRM



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

							I race M	etals	Verifica	ition	by ICP-N	E S	g/mL)						
			Contraction of the local division of the loc				antine we have been		A DAMAGENERAL						A CALCULATION OF THE OWNER	and the second second			STOLES WANTED
A	40.02	ß	<0.02	Dy	<0.02	Hf	<0.02	5	<0.02	N	40.02	Pr	<0.02	Se	<0.2	1	40.02	W	433
S	<0.02	ក្ខ	A 0,2	막	A0,02	Но	A).02		<0.02	Ş	3	đ	3	9	4	9		: :	0.02
Ac	3	Ş	3	đ	3	•		;				-		ç	•	10	70.02	c	20.02
J I	1	Ę	NU.U2	2	20.05	B	20.02	Mg	<0.01	9	40.02	Rh	4).02	Ą	A0.02	H	40.02	<	A).02
58	20.02	S	<0.02	ନୁ	40.02	F	40.02	Mn	40.02	P	A).02	Rb	400	Ž	41,7	Ţ.	3	\$	3
Be	40.01	ନ	40.02	G	3	ž1	3	Ę	3	9	3	7	3		2	1			10.04
d.	3	2	2)				9.1	10.4	'n	20.02	N	<0.02	ų	20.02		20.02	×	<0.02
	20.02	S	20.02	ନ୍ନ	20.02	5	40.02	Mo	<0.02	7	A.0	SB	<0.02	Ś	<0.02	8	2002	7	3
t	<0.02	2	<0.02	Au	40.02	\$	A0.02	Nd	40,02	ĸ	4 0.2	8	40.03	<u>_</u>]	3	1	3	2	3

(T) = Target analyte

Physical Characterization:

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

Son P. Shr

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.

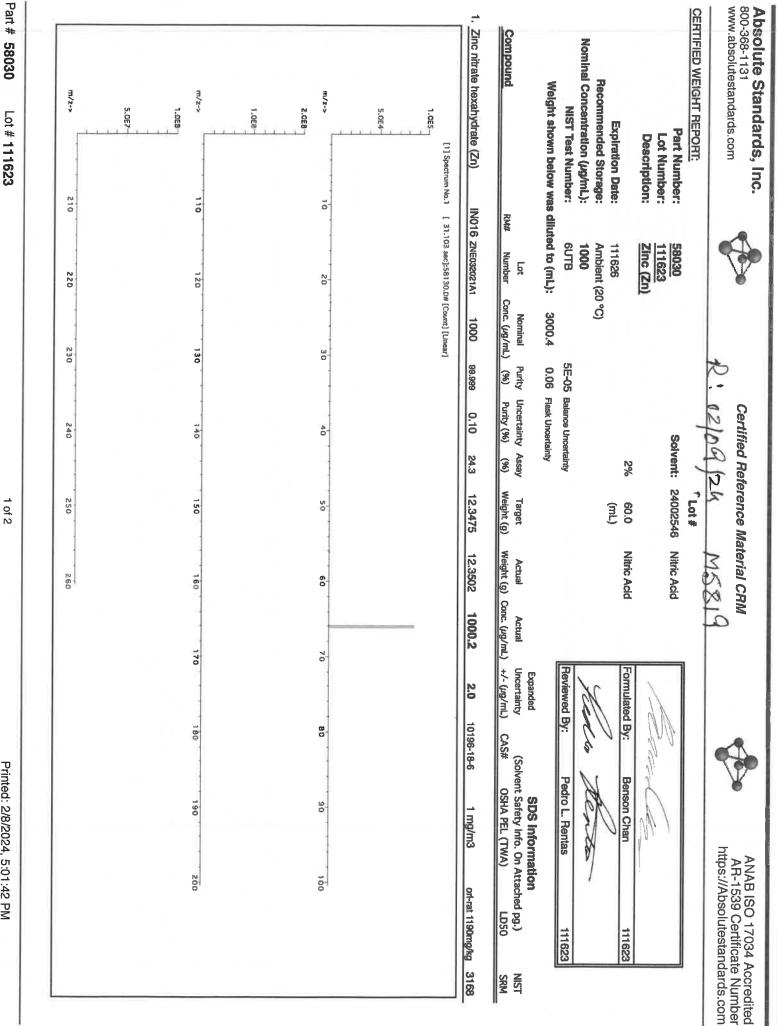
* All standard containers are meticulously cleaned prior to use.

* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. * 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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Part # 57014 Lot # 122023



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Certified Reference Material CRM



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

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

Trace Metals Verification by ICP-MS (ug/mL)AlA002C4A002DyA002HfA002NA002NA002MA002MA002AlA002CaA02DyA002HfA002LiA002NA002M <t< th=""><th>N.</th><th></th></t<>	N.	
Trace Metals Verification by ICP-MS (µg/mL) G_{12}	₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩	
Trace Metals Verification by ICP-MS (µg/mL) 402 Dy 402 Hf 402 II 402 II 402 NI 402 <t< td=""><td>40.02 40.02 40.02 40.02 40.02 40.02</td><td></td></t<>	40.02 40.02 40.02 40.02 40.02 40.02	
Trace Metals Verification by ICP-MS (μ g/mL)Py $\Delta 02$ HI $\Delta 02$ Li $\Delta 02$ Ni $\Delta 02$ Pr </td <td>5 S</td> <td></td>	5 S	
Trace Metals Verification by ICP-MS (μ g/mL) 402^{2} Hr 402^{2} Li 402^{2} Ni 402^{2} Pr 402^{2} </td <td>444 444 10 10 10 10 10 10 10 10 10 10 10 10 10</td> <td></td>	444 444 10 10 10 10 10 10 10 10 10 10 10 10 10	
Trace Metals Verification by ICP-MS (μ g/mL)Hi 402 Li 402 Ni 402 Pr 402 Se 402 Th 402 NiHo 402 Li 402 Ni 402 Pr 402 Re 402 Si 402 Th 402 ViHo 402 Mg 402 Nb 402 Re 402 Si 402 Th 402 ViHo 402 Mg 402 Pi 402 Re 402 Si 402 Th 402 ViHe 402 Mg 402 Pi 4022 Ru 4022 Ru 4022 Na 402 Th 402 ViHe 402 Mg 402 Pi 4022 Ru 4022 Si 402 Th 402 ViHe 402 Mg 402 Pi 4022 Ru 4022 Si 402 Th 402 ViHe 402 Ni 402 Ri 402 Si	돌 양 양 당 쿄 쇼 소	
Trace Metals Verification by ICP-MS (μ g/mL)40.2Li40.2Ni40.2Pr40.2Se40.2Th40.2V40.2Lu40.2Ni40.2Pr40.2Si40.2Th40.2V40.2Mg40.2Nb40.2Re40.2Si40.2Th40.2V40.2Mg40.2Pi40.2Rb40.2Ag40.2Th40.2V40.2Mg40.2Pi40.2Rb40.2Na40.2Th40.2V40.2Hg40.2Pi40.2Si40.2Th40.2V40.2Na40.2Ru40.2Si40.2Th40.2Y40.2Ni40.2Si40.2Si40.2Th40.2Y40.2Ni40.2Si40.2Si40.2Ti40.2Zi40.2Ni40.2Si40.2Si40.2Ti40.2Zi	444444 888888888	
Metals Verification by ICP-MS (μ g/mL) Li 4002 Ni 4002 Pr 4002 Sc 402 Th 4002 V Mg 4002 Nb 4002 Re 4002 Sc 4002 Sc 4002 V Mg 4002 Nb 4002 Re 4002 Sc 4002 Th 4002 V Mg 4002 Pd 4002 Rb 4002 Ag 4002 V Mg 402 P 4002 Ru 4002 Na 402 Y Mg 402 P 4022 Sr 4022 Th 4022 Y Mo 4002 Rt 4022 Sr 4002 Sr 4002 Y Mo 402 K 402 Sr 402 Th 402 Zr Mo 402 K 402 Sr 402 Ti 402 Zr	요만站片甲와斑	
S Verification by ICP-MS (µg/mL) 4002 Ni 4002 Pr 4002	4 4 4 4 4 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Trace Me
Ni A002 Pr A002 Sc A02 Th A002 W Nb A002 Re A002 Si A002 Th A002 U Nb A002 Re A002 Si A002 Te A002 U Pd A002 Ru A002 Ag A002 Ti A002 U P A002 Ru A002 Sr A002 Th A002 V V P A002 Su A002 Sr A002 Th A002 V V P A002 Su A002 Ti A002 V V Ru A002 Sr A002 Tin A002 V Ru A002 Sr A002 Tin A002 Y Ru A002 Sr A002 Tin A002 Zin K A02 Sc A002	NA S S S S S S S S S S S S S S S S S S S	etals
A0.02 Pr A0.02 Se A0.2 Th A0.02 W A0.02 Re A0.02 Si A0.02 Th A0.02 U A0.02 Re A0.02 Si A0.02 Th A0.02 U A0.02 Ru A0.02 Si A0.02 Ti A0.02 U A0.02 Ru A0.02 Si A0.02 Ti A0.02 U A0.02 Ru A0.02 Si A0.02 Ti A0.02 V A0.02 Ru A0.02 Si A0.02 Ti A0.02 V A0.02 Sin A0.02 Si A0.02 Tin A0.02 V A0.02 Sin A0.02 Sin A0.02 Y Sin A0.02 Y A0.2 Sin A0.02 Ti A0.02 Yin A0.02 Zin	4002 4002 4002	Verifica
P-MS (µg/mL) Pr -0.02 Se -0.2 Tb -0.02 W Re -0.02 Si -0.02 Te -0.02 U Rb -0.02 Si -0.02 Te -0.02 U Rb -0.02 Na -0.02 Ti -0.02 U Rb -0.02 Na -0.02 Ti -0.02 U Ru -0.02 Na -0.02 Ti -0.02 V Sm -0.02 St -0.02 Ti -0.02 V Sc -0.02 St -0.02 Ti -0.02 V St -0.02 St -0.02 Ti -0.02 Y Sc -0.02 St -0.02 Ti -0.02 Y Sc -0.02 St -0.02 Ti -0.02 Za Sc -0.02 St -0.02 Za	지과 한 문 은 못 지	tion
	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	hv ICP-
$ \begin{array}{ c c c c c c c c } & & & & & & & & & & & \\ & & & & & & & $	Sen Re	3
40.2 Th 40.02 W 40.02 Te 40.02 W 40.02 Te 40.02 U 40.02 Th 40.02 V 40.02 Th 40.02 V 40.02 Th 40.02 V 40.02 Th 40.02 Y 40.02 Sh 40.02 Y 40.02 Ti 40.02 Zh		(in/ml)
Th 40.02 W Th 40.02 U Th 40.02 U Th 40.02 V Sh 40.02 Y Th 40.02 Y Th 40.02 Y Th 40.02 Y Th 40.02 Y	Ta S Na Ag	
40.02 40.02 40.02 40.02 7 40.02 7 7 8 40.02 7 7 8 7 7 8 7 7 8 7 7 8 7 8 7 7 8 7 8	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
ガマイベート	금등립급급대역	
	4 4 4 4 4 4 8 8 8 8 8 8 8 8 8 8 8 8	
4 4 4 4 4 7 7 8 8 8 8 8 8 7 8 8 8 8 8 8	2 ² 4 2 4 6 4	
	4 4 4 4 4 4 4 4 4 4 7 4 4 6 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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

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

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

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

Part # 58030 Lot # 111623

Printed: 9/21/2022, 11:20:01 PM	1 of 2			Part # 56138 Lot # 082922
20 0	250	240	220 230	m/z-> 210
				N 07 5 О П П О О
160 170 180 190 200	150 10	0 140	120 130	m/z-> 110
				5. 0 E 5
60 70 80 90 100	50	40	20 30	m/z-> 10
				₽.5E6
	unt] [Linear]	14.495 sec]:58138.D# [Count] [Linear]	_	[1] Speatrum No.1 5.0E6
10000.1 20.0 10042-76-9 NA orf-rat >2000mg/kg 3		99.997 0.10	7 SRZ022018A1	trate (Sr)
Expanded SDS Information Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) NIST Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50 SRM	Target Weight (g)		Lot Nominal RM# Number Conc. (µg/mL)	Compound
Reviewed By: Pedro L. Rentas 082922		5E-05 Balance Uncertainty 0.058 Flask Uncertainty	6018 diluted to (mL): 1000.12	Weight shown below was diluted to (mL):
Nuic Acid Formulated by: Lawrence barry 082922	(mL)	6 1	082925 Ambient (20 °C) 10000	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):
Advance Bary	20510011	Solvent:	<u>56138</u> <u>082922</u> <u>Strontium (Sr)</u>	Part Number: Lot Number: Description:
I CRM ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	Certified Reference Material CRM いままのション	Certified Ref এ৯।।১।২३ শ	R:	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com CERTIFIED WEIGHT REPORT:

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

							race Me	tais	Verifica	TION	by ICP-	MC (/Jm/b/						
					10-31										10 T		ALC: NO		No. of Concession, No. of Conces
AI	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Ε.	40.02	<u>N</u>	<0.02	Pr	<0.02	Se	<0.2	ТЪ	<0.02	W	<0.02
SР	<0.02	Ca	<0.2	막	<0.02	Но	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	ŝ	<0.02	Te	△ .02	q	<0.02
As	<0.2	ĉ	<0.02	E	<0.02	ľ	<0.02	Mg	<0.01	õ	<0.02	Rh	<0.02	Ag	<0.02	H	<0.02	<	<0.02
Ba	<0.02	ß	<0.02	ନ୍ଦ	<0.02	F	<0.02	M'n	<0.02	Pd	<0.02	RЬ	<0.02	Na	<0.2	Ţ	<0.02	YЪ	<0.02
Be	<0.01	Ω	<0.02	Ga	<0.02	F	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	Ţ	Tm	<0.02	¥	<0.02
Bi	<0.02	ĉ	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Ŗ	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
в	<0.02	Cu	<0.02	Au	<0.02	РЪ	<0.02	Nd	<0.02	ĸ	<0.2	Sc	<0.02	Ta	<0.02	E	<0.02	Zr	<0.02

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

(T)= Target analyte

Physical Characterization:

Certified by:

In P. A.

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

Part # 56138 Lot # 082922

2 of 2