

Prep Standard - Chemical Standard Summary

Order ID : P4495

Test : Mercury, Metals ICP-Group1

Prepbatch ID : PB164552,PB165242,

Sequence ID/Qc Batch ID: LB133227,LB133669,LB133739,

Standard ID :

MP82961,MP82962,MP82963,MP82964,MP82965,MP82966,MP82967,MP82968,MP82969,MP82970,MP82971,MP82972,MP82973,MP82996,MP83078 MP83079 MP73080 MP83081 MP83082 MP83084,MP83083,MP83085,MP83086 MP83087,MP83088,MP83091 MP83092,MP83122,

Chemical ID :

M121,M5062,M5192,M5218,M5288,M5295,M5296,M5390,M5394,M5429,M5467,M5498,M5515,M5585,M5658,M5697, M5698,M5747,M5748,M5769,M5798,M5799,M5800,M5801,M5802,M5806,M5814,M5815,M5816,M5817,M5818,M5819, M5820,M5875,M5953,M5962,M5970,M5978,M5982,M6000,M6009,M6021,M6023,M6028,M6030,M6033,M6095,M610 4,M6111,M6116,M6117,M6125,M6126,W3112,



Recipe ID 871	NAME MERCURY INTERMEDIATE B 250PPB WORKING STD.	<u>NO.</u> MP82961	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipetteID METALS_PIP ETTE_5 (HG	Sarabjit Jaswal
FROM	1.00000ml of M6104 + 2.50000ml of	M5062 + 96	5.50000ml of V	V3112 = Final	Quantity: 100.0	00 ml	A)	

<u>Recipe</u> <u>ID</u> 1340	NAME Hg 0.00 PPB STD	<u>NO.</u> MP82962	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipettelD METALS_PIP ETTE_5 (HG	Sarabjit Jaswal
FROM	I 2.50000ml of M6104 + 247.50000ml	I of W3112 =	I Final Quantit	ty: 250.000 ml			A)	10/01/2024



Recipe ID 1341 FROM	NAME Hg 0.2 PPB STD 2.50000ml of M6104 + 247.30000ml	<u>NO.</u> MP82963 of W3112 +	Prep Date 10/30/2024 0.20000ml of	Expiration Date 10/31/2024 MP82961 = F	Prepared By Mohan Bera	ScaleID None	<u>PipetteID</u> METALS_PIP ETTE_5 (HG A)	Sarabjit Jaswal 10/31/2024
<u>Recipe</u> <u>ID</u> 1342	NAME Hg 2.5 PPB STD	<u>NO.</u> MP82964	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIP ETTE_5 (HG	Sarabjit Jaswal
FROM	2.50000ml of M6104 + 245.00000ml	of W3112 +	2.50000ml of	MP82961 = F	inal Quantity: 25	60.000 ml	A)	



Recipe ID 1343 FROM	NAME Hg 5.0 PPB STD 2.50000ml of M6104 + 242.50000ml	<u>NO.</u> MP82965 of W3112 +	Prep Date 10/30/2024 5.00000ml of	Expiration Date 10/31/2024 MP82961 = F	Prepared By Mohan Bera inal Quantity: 25		PipetteID METALS_PIP ETTE_5 (HG A)	Sarabjit Jaswal 10/31/2024
<u>Recipe</u> <u>ID</u> 1344	NAME Hg 7.5 PPB STD	<u>NO.</u> MP82966	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	<u>PipetteID</u> METALS_PIP ETTE_5 (HG	Sarabjit Jaswal



<u>Recipe</u> <u>ID</u> 1345	NAME Hg 10.0 PPB STD	<u>NO.</u> MP82967	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipetteID METALS_PIP ETTE_5 (HG	Sarabjit Jaswal
FROM	2.50000ml of M6104 + 237.50000ml	of W3112 +	10.00000ml c	of MP82961 =	Final Quantity: 2	250.000 ml	- <u>A</u>) -	
<u>Recipe</u> <u>ID</u>	NAME	<u>NO.</u>	<u>Prep Date</u>	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised Bγ</u> Sarabjit Jaswal

1346	Hg ICV SOLUTION	<u>MP82968</u>	10/30/2024	10/31/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	10/31/2024
FROM	2.50000ml of M5953 + 2.50000ml of	M6104 + 24	5.00000ml of	W3112 = Fina	I Quantity: 250.	000 ml	A)	



Recipe ID 1351	NAME ICB (Hg 0.00 PPB SOLUTION)	<u>NO.</u> MP82969	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipettelD METALS_PIP ETTE_5 (HG	Sarabjit Jaswal
FROM	2.50000ml of M6104 + 247.50000ml	of W3112 =	Final Quantit	ty: 250.000 ml			<u>Α</u>	
<u>Recipe</u>				Expiration	<u>Prepared</u>			Supervised By

<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> Sarabjit Jaswal
1358	CCV (Hg 5.0 PPB SOLUTION)	<u>MP82970</u>	10/30/2024	10/31/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	10/31/2024
FROM	485.00000ml of W3112 + 5.00000ml	of M6104 +	10.00000ml o	of MP82961 =	Final Quantity: 5	500.000 ml	A)	



Recipe ID 1352	NAME CCB (Hg 0.00 PPB SOLUTION)	<u>NO.</u> MP82971	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipettelD METALS_PIP ETTE_5 (HG A)	Sarabjit Jaswal
<u>FROM</u>	495.00000ml of W3112 + 5.00000ml	of M6104 =	Final Quantit	y: 500.000 ml			~)	
Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	PipettelD	<u>Supervised By</u> Sarabiit Jaswal

1349 CRA/CRI (Hg 0.2 PPB SOLUTION) MP82972 10/30/2024 10/31/2024 Mohan Bera None METALS_PIP ETTE_5 (HG Sarabjit Jaswal FROM 2.50000ml of M6104 + 247.30000ml of W3112 + 0.20000ml of MP82961 = Final Quantity: 250.000 ml A) A) A)



Recipe ID 1350	NAME CHK STD (Hg 7.0 PPB SOLUTION)	<u>NO.</u> MP82973	Prep Date 10/30/2024	Expiration Date 10/31/2024	Prepared By Mohan Bera	<u>ScaleID</u> None	PipettelD METALS_PIP ETTE_5 (HG	
<u>FROM</u>	2.50000ml of M6104 + 240.50000ml	of W3112 +	7.00000ml of	MP82961 = F	inal Quantity: 2	i 50.000 ml	A)	
Pasing				Expiration	Bronorod			Supervised By

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	PipettelD	Sarabjit Jaswal
104	5% RINSING HCL	<u>MP82996</u>	10/31/2024	04/30/2025	Mohan Bera	None	None	
								10/31/2024
FROM	100.00000ml of M6095 + 1900.0000	0ml of W311	2 = Final Qua	antity: 2000.00	0 ml			



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Recipe ID 2950	NAME ICP AES S1/CRI STOCK STD	<u>NO.</u> MP83083	Prep Date 11/06/2024	Expiration Date 12/06/2024	<u>Prepared</u> <u>By</u> Kareem Khairalla	<u>ScaleID</u> None	PipetteID None	Sarabjit Jaswal
FROM	0.03000ml of M5798 + 0.03000ml of of M6033 + 0.06000ml of M5747 + 0 0.10000ml of M5962 + 0.10000ml of of M5799 + 0.20000ml of M5819 + 0 0.50000ml of M5390 + 0.50000ml of of M5769 + 1.00000ml of M5806 + 1 MP83078 = Final Quantity: 100.000	.10000ml of M5970 + 0. .20000ml of M5814 + 1. .00000ml of	M5697 + 0.10 10000ml of M M6021 + 0.20 00000ml of M	0000ml of M569 5982 + 0.15000 0000ml of M602 5192 + 1.00000	98 + 0.10000ml 0ml of M5800 + 23 + 0.25000ml 0ml of M5288 +	of M5801 + 0.1 0.20000ml of M of M5467 + 0.2 1.00000ml of M	0000ml of M58 5748 + 0.2000 5000ml of M58 5498 + 1.0000	320 + 00ml 302 +

<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> Sarabjit Jaswal
912	ICP AES ICV SOLN	<u>MP83085</u>	11/06/2024	12/06/2024	Kareem Khairalla	None	None	11/07/2024
FROM	0.02500ml of M5429 + 0.02500ml of of M5295 + 89.77500ml of MP83078				0ml of M5218 +	0.25000ml of M	15982 + 10.000)00ml



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Recipe ID 911	NAME ICP AES CCV SOLN	<u>NO.</u> MP83088	Prep Date 11/06/2024	Expiration Date 12/06/2024	Prepared By Kareem Khairalla	<u>ScaleID</u> None	<u>PipetteID</u> None	Sarabjit Jaswal
FROM	50.00000ml of MP83078 + 50.00000	ml of MP830)79 = Final Q	uantity: 100.00	0 ml			

<u>Recipe</u>				Expiration	Prepared			Supervised By
ID	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	PipetteID	Sarabjit Jaswal
169	1:1HNO3	<u>MP83122</u>	11/07/2024	12/06/2024	Janvi Patel	None	None	
								11/07/2024
FROM	1000.00000ml of M6116 + 1000.000	00ml of W31	12 = Final Qu	uantity: 2000.00	00 ml			



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	MSHG-10PPM / MERCURY HCI 125mL 10ug/mL	S2-HG709270	09/22/2026	05/28/2022 / mohan	01/27/2022 / mohan	M5062
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
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti	S2-MEB711674	11/02/2026	07/01/2022 / bin	09/10/2021 / bin	M5218
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 #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	02/05/2025	08/07/2024 / jaswal	02/20/2020 / bin	M5295
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.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	08/07/2024 / jaswal	09/18/2022 / bin	M5390
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	11/28/2022 / bin	09/19/2022 / bin	M5394
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
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57058 / Cerium, 1000PPM, 100ML	020623	02/06/2026	03/06/2023 / bin	03/01/2023 / bin	M5467
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	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 #

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	092122	09/21/2025	08/01/2024 / Jaswal	03/17/2023 / bin	M5515



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	26397-103 / PTFE BOILING STONES	W126678	02/28/2025	01/20/2024 / jaswal	06/12/2023 / jaswal	M5585
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.	/ Nickel (Ni) 1000PPM	091223	09/12/2026	01/02/2024 / bin	12/20/2023 / jaswal	M5748



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	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	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
		-		•	•	

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	120523	12/05/2026	08/07/2024 / jaswal	01/03/2024 / jaswal	M5802



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ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
58111 / Na, 10000 PPM, 500 ml	122223	12/22/2026	08/01/2024 / Jaswal	01/03/2024 / jaswal	M5806
ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
57005 / B, 1000 PPM, 125 ml	071123	07/11/2026	03/26/2024 / Sohil	01/03/2024 / jaswal	M5814
ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815
ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
57016 / S, 1000 PPM, 125 ml	122923	12/29/2026	05/20/2024 / Jaswal	02/09/2024 / jaswal	M5816
ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817
ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 /	02/09/2024 / jaswal	M5818
	58111 / Na, 10000 PPM, 500 ml itemCode / ItemName 57005 / B, 1000 PPM, 125 ml itemCode / ItemName 57115 / P, 10000 PPM, 125 ml itemCode / ItemName 57016 / S, 1000 PPM, 125 ml itemCode / ItemName 57016 / S, 1000 PPM, 125 ml itemCode / ItemName itemCode / ItemName 57116 / S, 10000 PPM, 125 ml itemCode / ItemName itemCode / ItemName itemCode / ItemName	S8111 / Na, 10000 PPM, 500 ml 122223 ItemCode / ItemName Lot # 57005 / B, 1000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57115 / P, 10000 PPM, 125 ml 041723 ItemCode / ItemName Lot # 57016 / S, 1000 PPM, 125 ml 122923 ItemCode / ItemName Lot # 57016 / S, 1000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57016 / S, 10000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57116 / S, 10000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57014 / Si, 10000 PPM, 125 122023	ItemCode / ItemName Lot # Date 58111 / Na, 10000 PPM, 500 ml 122223 12/22/2026 ItemCode / ItemName Lot # Expiration Date 57005 / B, 1000 PPM, 125 071123 07/11/2026 ItemCode / ItemName Lot # Expiration Date 57016 / B, 1000 PPM, 125 ml 041723 04/17/2026 ItemCode / ItemName Lot # Expiration Date 57016 / S, 1000 PPM, 125 122923 12/29/2026 ItemCode / ItemName Lot # Expiration Date 57016 / S, 1000 PPM, 125 122923 12/29/2026 ItemCode / ItemName Lot # Expiration Date 57116 / S, 10000 PPM, 125 ml 07/1123 07/11/2026 57014 / Si, 10000 PPM, 125 122023 12/20/2026	ItemCode / ItemName Lot # Date Opened By 58111 / Na, 10000 PPM, 500 ml 122223 12/22/2026 08/01/2024 / Jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By 57005 / B, 1000 PPM, 125 ml 071123 07/11/2026 03/26/2024 / Sohil ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By 57115 / P, 10000 PPM, 125 ml 041723 04/17/2026 05/21/2024 / Jaswal S7016 / S, 1000 PPM, 125 ml Lot # Expiration Date Date Opened / Opened By 57016 / S, 1000 PPM, 125 ml 122923 12/29/2026 05/20/2024 / Jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By 57016 / S, 1000 PPM, 125 122923 12/29/2026 05/20/2024 / Jaswal 57116 / S, 10000 PPM, 125 07/1123 07/11/2026 03/01/2024 / Jaswal 57016 / S, 10000 PPM, 125 122023 12/20/2026 03/00/2024 / Jaswal	ItemCode / ItemName Lot # Date Opened By Received By 58111 / Na, 10000 PPM, 500 ml 122223 12/22/2026 08/01/2024 / Jaswal 01/03/2024 / jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Sohil 57005 / B, 1000 PPM, 125 ml 071123 07/11/2026 Date Opened / Sohil Received Date / Pened By 57105 / B, 1000 PPM, 125 ml Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Received By 57115 / P, 10000 PPM, 125 ml 041723 04/17/2026 05/21/2024 / Jaswal 02/09/2024 / jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received By 57016 / S, 1000 PPM, 125 122923 12/29/2026 Date Opened / Opened By Received Date / Received Date



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 #
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
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 #
EPA	ICV-5 / ICV (HG)STOCK SOLN	ICV5-0415	01/01/2025	07/01/2024 / mohan	03/30/2023 / mohan	M5953
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57003 / Li, 1000 PPM, 125 ml	061224	06/21/2027	07/01/2024 / Jaswal	07/01/2024 / Jaswal	M5970



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Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	06/17/2027	08/07/2024 / jaswal	02/22/2024 / Jaswal	M5978	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	031524	03/15/2027	07/01/2024 / Jaswal	06/11/2024 / Jaswal	M5982	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	WW-LFS-1 / Laboratory Fortified Stock Solution 1, 125 ml	T2-MEB723367	08/30/2026	08/13/2024 / Jaswal	05/14/2024 / Jaswal	M6000	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml	U2-MEB731108	03/17/2028	08/13/2024 / Jaswal	05/14/2024 / Jaswal	M6009	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023	



(cs/6x2.5L)

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57048 / Cd, 1000 PPM, 125 ml	070124	07/01/2027	08/05/2024 / kareem	01/25/2019 / Jaswal	M6028
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / AI, 10000 PPM, 500 ml	011623	01/16/2026	08/07/2024 / Jaswal	01/03/2024 / Jaswal	M6033
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)		03/17/2029	10/26/2024 / Janvi	10/21/2024 / Janvi	M6095
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	04/30/2025	10/30/2024 / Eman	09/29/2024 / Janvi	M6104
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	22F0762009	05/09/2027	11/04/2024 / Eman	09/29/2024 / Janvi	M6111



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)	24B1362001	05/03/2025	11/04/2024 / Janvi	09/29/2024 / Eman	M6116
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid,	24B1362001	05/06/2025	11/06/2024 /	09/29/2024 /	

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	05/25/2025	11/26/2024 / Eman	11/22/2024 / Eman	M6125

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	06/03/2025	12/03/2024 / Janvi	11/12/2024 / Janvi	M6126

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	07/03/2029	07/03/2024 / Iwona	07/03/2024 / Iwona	W3112

m/z->	1.067	m/z-> 2.0€7	5.014	m/z-> 1.0E5	2.5E4	5. 0 114	1. Cadmium nitrate tetrahydrate (Cd)	Compound	Weight shov	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):		CERTIFIED WEIGHT REPORT:	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
		 		0 ⁶		[1] Spectrum No.1		RM#	Weight shown below was dliuted to (mL):	Expiration Date: nended Storage: ntration (µg/mL):	Part Number: Lot Number: Description:	PORT:	15, Inc. om
		120		20		-	IN024 CDM092021A1	Lot Number	6UTB uted to (mL):	070127 Ambient (20 °C) 1000	<u>57048</u> <u>070124</u> Cadmium (Cd)		
		130		30		12.514 800	1000 99.	Nominal Pu Conc. (µg/mL) (1	2000.07 0.1		(Cd)		R
200		140		\$		12.514 sec]:58148.D# [Count] [Linear]	99.999 0.10 36.5	Purity Uncertainty Assay (%) Purity (%) (%)	5E-05 Balance Uncertainty 0.100 Flask Uncertainty		Solvent: 2%		Certified R
		1 () ()		ő		Count] [Line	.5 5.4797	say Target 6) Weight (g)	ţ		ent: 24002546 2% 40.0	Lot #	Certified Reference Material CRM S 15 12 4
		160		0 O		ar]	5.4804	Actual Actual Weight (g) Conc. (µg/mL)			Nitric Acid		terial CRM
		170		70			1000.1	11	Re	5	5		M6028
		-1 2 C		BO			10022-68-1	Expanded Uncertainty (Solvent +/- (µg/mL) CAS# 0	Reviewed By: Ped	\$	Alloch & B		-
		190 200		90 100				SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD51	Pedro L. Rentas	ento	Brack		ANAB IS AR-153 https://Ab
				-			orl-rat 60.2mg/kg 3108	ned pg.) NIST LD50 SRM	070124		070194		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

1 of 2

Part # 57048

Lot # 070124

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

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

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Physical Characterization:

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

In P. S.

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).

e24

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					
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:									
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 Solution		
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 VALUES AND UNCERTAINTIES			

ANALYTE Aluminum, Al	CERTIFIED VALUE 2 000 ± 7 μg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 2 000 ± 9 μg/mL
Beryllium, Be	50.00 ± 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

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

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

Certificate of Analysis

Refine your results. Redefine your industry. RD:05/14/2024

INORGANIC" V E N T U R E S

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	WW-LFS-1
Lot Number:	T2-MEB723367
Matrix:	5% (v/v) HNO3

	Value / Analyte(s):	1 000 µg/mL ea: Potassium,		
		600 μg/mL ea: Phosphorus,		
		300 µg/mL ea: Sodium,	Iron,	
		200 µg/mŁ ea: Magnesium, Cerium, Thallium,	Aluminum, Selenium,	
		100 µg/mL ea: Lead,	Calcium,	
		80 μg/mL ea: Arsenic,		
		70 μg/mL ea: Mercury,		
		50 μg/mL ea: Nickel,		
		40 µg/mL ea: Chromium,		
		30 µg/mL ea: Copper, Vanadium,	Boron,	
		20 μg/mL ea: Zinc, Barium, Cadmium, Manganese,	Strontium, Beryllium, Cobalt, Lithium,	
3.0	CERTIFIED VALUES	7.5 µg/mL ea: Silver AND UNCERTAINTI	ES	

ANALYTE Aluminum, Al	CERTIFIED VALUE 200.0 ± 0.7 µg/mL	ANALYTE Arsenic, As	CERTIFIED VALUE 80.0 ± 0.7 µg/mL
Barium, Ba	20.00 ± 0.09 µg/mL	Beryllium, Be	20.00 ± 0.13 µg/mL
Boron, B	30.00 ± 0.18 µg/mL	Cadmlum, Cd	20.00 ± 0.09 µg/mL
Calcium, Ca	100.0 ± 0.4 μg/mL	Cerium, Ce	200.0 ± 0.8 μg/mL
Chromium, Cr	40.00 ± 0.30 μg/mL	Cobalt, Co	20.00 ± 0.10 µg/mL
Copper, Cu	30.00 ± 0.13 µg/mL	Iron, Fe	300.0 ± 1.3 μg/mL
Lead, Pb	100.0 ± 0.4 µg/mL	Lithium, Li	20.00 ± 0.08 µg/mL
Magneslum, Mg	200.0 ± 0.8 µg/mL	Manganese, Mn	20.00 ± 0.08 µg/mL
Mercury, Hg	70.0 ± 0.3 µg/mL	Nickel, Ni	50.00 ± 0.22 μg/mL
Phosphorus, P	600.0 ± 2.7 μg/mL	Potassium, K	1 000 ± 4 µg/mL
Selenium, Se	200.0 ± 1.3 µg/mL	Silver, Ag	7.50 ± 0.03 μg/mL
Sodium, Na	300.0 ± 1.4 μg/mL	Strontium, Sr	20.01 ± 0.08 µg/mL
Thailium, Ti	200.0 ± 1.4 µg/mL	Vanadium, V	30.00 ± 0.13 μg/mL
Zinc, Zn	20.00 ± 0.09 µg/mL		

Density:

1.034 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE Ag	METHOD ICP Assay	NIST SRM# 3151	SRM LOT# 160729
Ag	Volhard	999c	999c
Ag	Calculated		See Sec. 4.2
A	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
В	ICP Assay	3107	190605
Ba	ICP Assay	3104a	140909
Ва	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Са	ICP Assay	3109a	130213
Са	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Се	ICP Assay	3110	090504
Ce	EDTA	928	928
Co	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
к	ICP Assay	3141a	140813
к	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	Traceable to 3152A	S2-NA700842
Na	Gravimetric	0400	See Sec. 4.2
Ni Ni	ICP Assay	3136	120619
P	EDTA	928 3139a	928
P	ICP Assay Acidimetric		060717
F Pb	ICP Assay	84L 3128	84L
Pb	EDTA	928	101026 928
Se	ICP Assay	3149	
Se	EDTA	928	100901 928
Sr	ICP Assay	Traceable to 3153a	920 K2-SR650985
TI	ICP Assay	3158	151215
V	IC Assay	3165	160906
v	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928
	Eco 4		

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

Characterization of CRM/RM by Two or More Methods	Characterization of CRM/RM by One Method
Certified Value, X _{CRMRM} , where two or more methods of characterization are used is the weighted mean of the results:	Certified Value, X _{CRM/RM} , where one method of characterization is used is the mean of individual results:
$\begin{split} & X_{CRM/RM} \equiv \Sigma(w_i) \; (X_i) \\ & X_i = \text{mean of Assay Method i with standard uncertainty } u_{char, i} \\ & w_i = \text{the weighting factors for each method calculated using the inverse square of the variance:} \\ & w_i = (1/u_{char, i})^2 / (\Sigma(1/(u_{char, i})^2)) \end{split}$	$X_{CRM/RM} = (X_a) (u_{char a})$ $X_a = mean of Assay Method A withu_{char a} = the standard uncertainty of characterization Method A$
CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k $(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{V_2}$ k = coverage factor = 2 $u_{char} = [\Sigma[(w_i)^2 (u_{char}_i)^2])^{V_2}$ where u_{char} is the errors from each characterization method u_{bb} = bottle to bottle homogeneity standard uncertainty $u_{lts} = long term stability standard uncertainty (storage) u_{te} = transport stability standard uncertainty$	CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k ($u^2_{chara} + u^2_{bb} + u^2_{tts} + u^2_{ts}$) ^{1/k} k = coverage factor = 2 u _{chara} = the errors from characterization u _{bb} = bottle to bottle homogeneity standard uncertainty u _{Its} = long term stability standard uncertainty (storage) u _{uts} = 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)

6.0 INTENDED USE

4.0

- 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 $20^{\circ} \pm 4^{\circ}$ 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

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

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

August 30, 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

- August 30, 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:

Thomas Kozikowski Manager, Quality Control

SD9781.

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Page 6 of 6

Certificate of Analysis

Refine your results. Redefine your industry. RD:05/14/2024

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

ÍNORGANÍ

VENTURES

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	WW-LFS-2
Lot Number:	U2-MEB731108
Matrix:	5% (v/v) HNO3 tr. HF
Value / Analyte(s):	200 μg/mL ea: Silica,
	80 μg/mL ea: Antimony,
	70 μg/mL ea: Tin,
	40 μg/mL ea: Molybdenum,
	20 μg/mL ea:
	Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Antimony, Sb	CERTIFIED VALUE 80.1 ± 0.6 µg/mL	ANALYTE Molybdenum, Mo	CERTIFIED VALUE 40.03 ± 0.18 µg/mL
Silica, SIO2	200.2 ± 1.3 μg/mL	Tin, Sn	70.0 ± 0.4 µg/mL
Titanium, Ti	20.01 ± 0.13 μg/mL		

Density:

1.025 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE Mo	METHOD ICP Assay	NIST SRM# 3134	SRM LOT# 130418
Мо	Calculated		See Sec. 4.2
Sb	ICP Assay	3102a	140911
SiO2	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
π	ICP Assay	3162a	130925
ті	Calculated		See Sec. 4.2

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

Characterization of CRM/RM by Two or More Methods

Certified Value, X_{CRWRM}, where two or more methods of characterization are used is the weighted mean of the results:

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

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

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

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

k = coverage factor = 2

 $\begin{array}{l} u_{char} = [\overline{\Sigma}((w_{i})^{2} \, (u_{char})^{2})]^{2} \ \ \, \mbox{ where } u_{char} \ \, _{i} \mbox{ are the errors from each characterization method} \\ u_{bb} = bottle \ \, \mbox{ bottle homogeneity standard uncertainty} \\ u_{hs} = long \ \, \mbox{ term stability standard uncertainty (storage)} \end{array}$

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

$$\begin{split} X_{CRM/RM} = (X_{a}) (u_{oher \ a}) \\ X_{a} = mean \ of Assay Method A with \\ u_{oher \ a} = the standard uncertainty of characterization Method A \end{split}$$

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

 $\label{eq:coverage factor = 2} \\ u_{char} a = the errors from characterization \\ u_{bb} = bottle to bottle homogeneity standard uncertainty$ $u_{its} = long term stability standard uncertainty (storage)$ $u_{its} = transport stability standard uncertainty$

- 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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

- For more information, visit www.inorganicventures.com/TCT HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 17, 2023

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

11.2 Lot Expiration Date

- March 17, 2028

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

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

- 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.

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

3D978

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com M5062 M5063

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

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Single Analyte Mass Spec Solution
Catalog Number:	MSHG-10PPM
Lot Number:	S2-HG709270
Matrix:	10% (v/v) HCI
Value / Analyte(s):	10 µg/mL ea: Mercury
Starting Material:	Hg metal
Starting Material Lot#:	1959
Starting Material Purity:	99.9994%
CERTIFIED VALUES	AND UNCERTAINTIES

Certified Value:	10.001 ± 0.053 μg/mL
Density:	1.020 g/mL (measured at 20 \pm 4 °C)

Assay Information:

3.0

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
Hg	Calculated		See Sec. 4.2

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

Characterization of CRM/RM by Two or More Methods	Characterization of CRM/RM by One Method
Certified Value, X _{CRM/RM} , where two or more methods of characterization are used is the weighted mean of the results:	Certified Value, X _{CRWRM} , where one method of characterization 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. $w_i = (1/u_{char} i)^2 / (\Sigma(1/(u_{char} i)^2))$	uchar 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 $(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{\frac{1}{2}}$
k = coverage factor = 2	k = coverage factor = 2
$u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$ where u_{char} are the errors from each characterization method	uchar 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)
uts = transport stability standard uncertainty	uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 μm.

0	Ag		0.000011	M	Eu	<	0.000201	0	Na		0.000004	М	Se	<	0.015915	0	Zn	<	0.001510
0	AI		0.000001	0	Fe		0.000001	М	Nb	<	0.000201	0	Si		0.000005	М	Zr	<	0.000201
М	As	<	0.000402	Μ	Ga	<	0.000201	Μ	Nd	<	0.000201	М	Sm	<	0.000201				
М	Au	<	0.003631	М	Gd	<	0.000201	M	Ni	<	0.000402	M	Sn	<	0.001007				
Μ	В	<	0.001208	М	Ge	<	0.000201	М	Os	<	0.000605	М	Sr	<	0.000201				
Μ	Ba	<	0.000201	Μ	Hf	<	0.000201	0	Ρ	<	0.032370	M	Та	<	0.000201				
Μ	Be	<	0.000201	s	Hg	<		Μ	Pb	<	0.000201	M	Tb	<	0.000201				
Μ	Bi	<	0.000201	М	Ho	<	0.000201	Μ	Pd	<	0.000403	М	Te	<	0.002216				
0	Ca		0.000007	Μ	In	<	0.000201	Μ	Pr	<	0.000201	М	Th	<	0.000201				
M	Cd	<	0.000201	М	lr	<	0.000201	Μ	Pt	<	0.000402	M	Ti	<	0.000402				
Μ	Ce	<	0.000201	0	Κ		0.000020	М	Rb	<	0.000201	0	ΤI	<	0.016508				
M	Co	<	0.000201	М	La	<	0.000201	Μ	Re	<	0.000201	Μ	Tm	<	0.000201				
0	Cr	<	0.003021	0	Li	<	0.000107	М	Rh	<	0.000201	М	U	<	0.008058				
М	Cs	<	0.001208	М	Lu	<	0.000201	Μ	Ru	<	0.000201	Μ	V	<	0.000201				
М	Cu	<	0.000402	0	Mg		0.000001	0	S	<	0.053950	М	W	<	0.000604				
M	Dy	<	0.000201	M	Mn	<	0.000604	М	Sb	<	0.001208	М	Y	<	0.000201				
Μ	Er	<	0.000201	М	Мо		0.000009	М	Sc	<	0.000201	М	Yb	<	0.000201				

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

6.0 INTENDED USE

- 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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59 +2 4 Hg(OH)(aq) 1+ Chemical Compatibility - Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.

Stability - 2-100 ppb levels not stable in 1% HNO3 / LDPE container, stable in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.

Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation guestions in further detail.).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 µg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th ,Rh , Fe,
			U

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 22, 2021

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

11.2 Lot Expiration Date

- September 22, 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 Prepared By:

Uyen Truong Supervisor, Product Documentation

Ulya new

Certificate Approved By:

Michael Booth Director, Quality Control

Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Paul R Laine

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 » (mL)	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	2	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
																			Non- Non- of Concession, Name of Concession, N

(T)= Target analyte

Physical Characterization:

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

Son 1. S

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 # 57042 Lot # 051722



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

130925

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

Ti

Product Code:	Multi Analyte Custom Grade Solution	on
Catalog Number:	CHEM-QC-4	
Lot Number:	S2-MEB711674	
Matrix:	3% (v/v) HNO3 3% (v/v) HF	
Value / Analyte(s):	1 000 μg/mL ea: Boron, Silicon, Titanium	Molybdenum, Tin,

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

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ICP Assay

ANALYTE Boron, B	CERTIFIED VALUE 1 000 ± 7 μg/mL	ANALYTE Molybdenum, Mo	CERTIFIED VALUE 1 000 ± 5 μg/mL	
Silicon, Si	1 000 ± 7 μg/mL	Tin, Sn	1 000 ± 5 μg/mL	
Titanium, Ti	1 001 ± 6 μg/mL			
Density:	1.032 g/mL (meas	sured at 20 ± 4 °C)		
Assay Information	ו:			
ANALYTE	METHOD	NIST SRM#		SRM LOT#
В	ICP Assay	3107		110830
Мо	ICP Assay	3134		130418
Si	ICP Assay	3150		130912
Sn	ICP Assay	3161a		140917

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.

3162a

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:

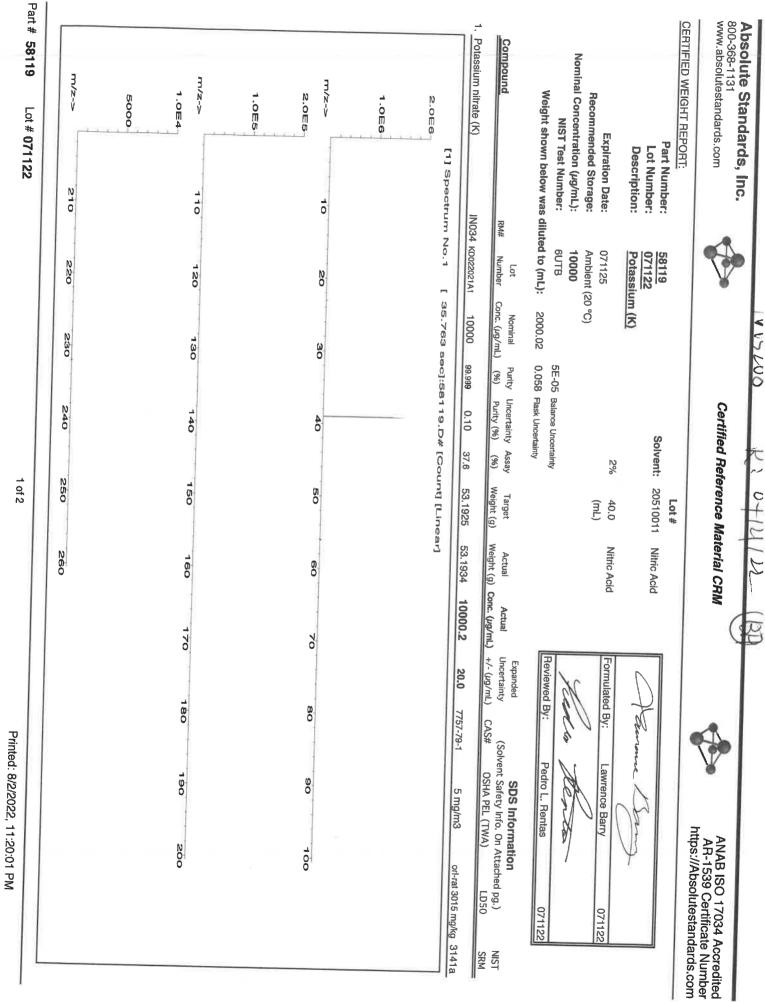
Michael Booth Director, Quality Control

Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Paul R Line



1 of 2

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		
<0.02	Trace Metals V		
40.02 40.02 40.02 Ca 40.02 Ca	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	<0.2	$\begin{array}{c c} W & < 0.02 \\ U & < 0.02 \\ V & < 0.02 \\ Y & < 0.02 \\ Y & < 0.02 \\ Z n & < 0.02 \\ \end{array}$
Physical Characterization:	(T)= Target analyte		1 10.02
Homogeneity: No heterogeneity was ob	Homogeneity: No heterogeneity was observed in the preparation of this standard.	Ce	Certified by:
		()	sold and a second
	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	ated. ed in	
 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		
	This is the second		
	D.C. (1994).		



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



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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Physical Characterization:

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

Certified by:

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- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
 - All standard containers are meticulously cleaned prior to use.
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 - Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
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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).

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>	
aterial CRM	Nitric Acid Nitric Acid Actual Actual		ar] 160 280	
leference M	20510011 20.0 (mL) (mL) Target	100.0134	0 0 0 0 220 0 220 0 220 0 220 0 220 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 of 2
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	
	C) C) 5E-05 B 1000.12 0.058 F Nominal Purity t no. (ug/mL) (%)	88.999	9.619 sec]:58103: 30 130 14 230 24 14	
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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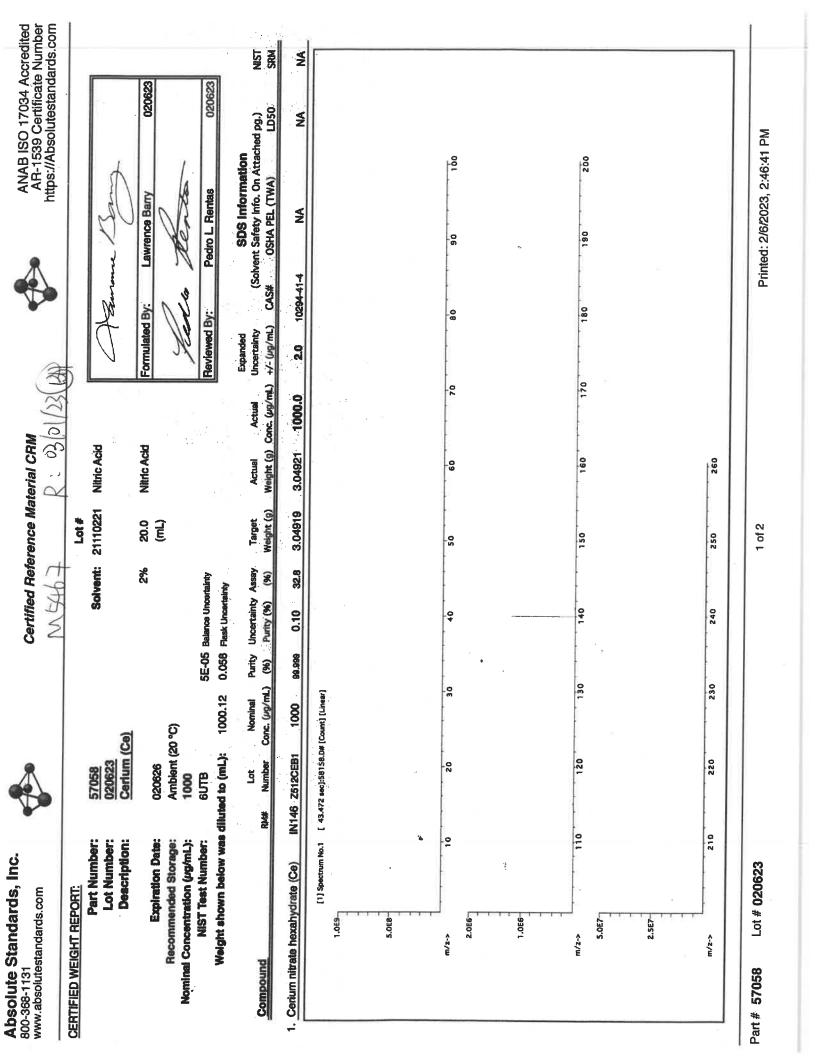
Physical Characterization:

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

Certified by:

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Lot # 070622 Part # 57103



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

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Physical Characterization:

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Certified by:

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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
ANA	Ped X Gio	SDS Information (Solvent Safety Info. On Attached pg.) CSHA PEL (TWA) LD5C C	-0 0	190
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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
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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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Certified Reference Material CRM



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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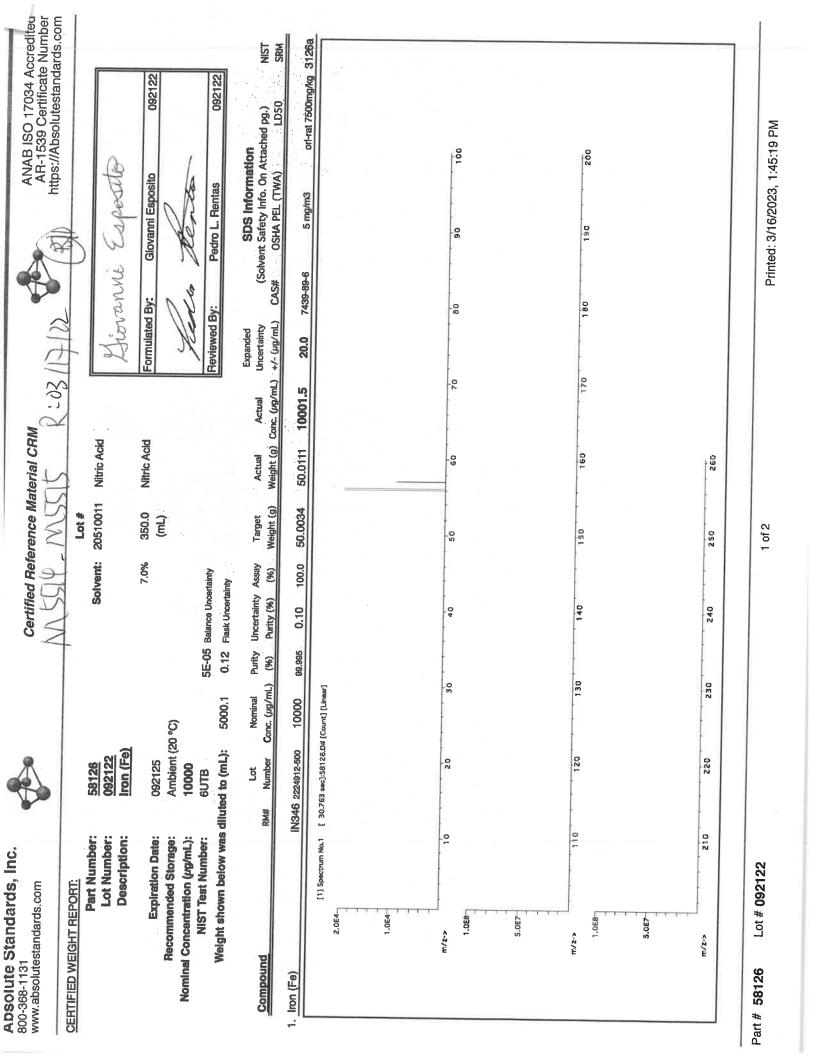
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Part # 58120 Lot # 031523



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Certified Reference Material CRM



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

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Lot # 092122 Part # 58126



MATERIAL CERTIFICATE OF COMPLIANCE

DATE: JUNE 12, 2023

CUSTOMER:PCI SCIENTIFIC SUPPLY, INCPURCHASE ORDER NO.6054931CATALOG NO.BOI5021-450LPRODUCT DESCRIPTION:BOILING STONES, TFE, 454GMSQUANTITY:10 EACH

SPECIFICATION (S): Made from Virgin PTFE Resin

LOT NO.

We certify that we have complied with the terms and conditions of the above Purchase Order and the Part Specifications in the manufacturing of the above product.

W126678

Valu

Laura Valencia Quality Assurance Inspector

F:U:J:GF:PCISCI:COC-55118-BOI5021-061223

m/z->	N .5 E 5	m/z-> 5.0E5	ស .0 ពា ស	m/z-≫ 1.0≣6	5000	1.004	1. Chromium(III) nitrate nonahydrate (Cr)	Compound	outs ewing A	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	Par De	CERTIFIED WEIGHT REPORT:	www.absolutestandards.com
N O		110		10		[1] Spectrum No.1		Pa	Volume shown below was diluted to (mL):	Expiration Date: nended Storage: ntration (µg/mL):	Part Number: Lot Number: Description:		5
220		120		N. O		-	58124 071122	Part Lot Number Number	filuted to (mL):	060526 Ambient (20 °C) 1000	58024 060523 Chromium (Cr)		
230		130		ů,		31,393 80	0.1000	Dilution Factor	2000.02		1 (Cr)		MS
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				ð.		31,393 sec]:57024.D# [Count] [Línear]	084 1000	Uncertainty Nominal Pipette (mL) Conc. (µg/mL)	Balance Uncertainty Flask Uncertainty		21110221 2.0%	Lot #) U
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		200		100				Attacher			Barry		AH-1539 Certificate Number https://Absolutestandards.com
							ori-rat 3250 mg/kg		626000	000500	060523		AH-1539 Certificate Number ttps://Absolutestandards.com
							3112a	SRM					rds.com

Part # 58024 Lot # 060523

1 of 2

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Absolute 800-368-1131 www.absolute	Absolute Standards, Inc. Certified Reference 800-368-1131 www.absolutestandards.com www.absolutestandards.com instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	י, Inc.	ctively	V Coupled	Plasm	na Mass S	Ce Ce	rtified Ru	eferer CP-Mi	Certified Reference Material Ci	rial C	RM						https	AB ISO 170 1-1539 Cert ://Absolute	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
						Trace N	Metals	Verification		by ICP-MS		/g/mL)								
A	-0.02 Cd	40.02	Dy	40.02	Hf	40.02		A).02	Ŋ	40.02		A).02	- Se	ð		7	A 33	W	000	
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		40.02) 달	-40.02	5	<0.02	Mg	<0.01	, õ	40.02	Rh	<0.02	Ag	<0.02			40.02	v (<0.02	
R Ba		-T T	ନ୍ଦୁ ହ	A 0.02	1) H	4. 6. B	F. M	A. 0.02	P Pd	3 8	R RB	A 0.02	e Na	202		1 2	8 8 8	; \$	A0.02	
		40.02	ନ ଜୁ	40.02	8 L :	a a 3	Nd No	8 8 8 8 8	× 7 ·	A A A	Sm	40.02	Tas	40.02				22-		
								(T)=1	(T)= Target analyte	nalyte										
Physical	Physical Characterization:	tion:															Certified by:	led by:		a
Homogen	Homogeneity: No heterogeneity was observed in the preparation of this standard.	neity was o	bserved	l in the prepa	ration c	of this stands	ard.										LA .	J.		K
* The ce * Purifiec * All star * Standa * Standa * All star Measu	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).	the conce standard rs are me rs are me ed gravim d (+/-) 0. d (+/-) 0. ce stored ce stored se stored " NIST Te	eionize s. s. etriculou etrical with c with c chnica	on calculat ed water, c usly cleaned ly using ba the stated aps tight <i>a</i> and Kuyat, and Kuyat,	ed fro alibrat d prior lances 1 value C.E., 1 C.E., 1 C.E., 1	ed Class <i>A</i> ed Class <i>A</i> to use. that are i that are i that approp Guidelines Governm	A glass A glass calibra therwia s for En hent Pr	ware and ware and ware and ware and with ware stated. Se stated aboratory valuating a valuating official section of the sectio	tric me the hig veights ce, Wa	easuremer yhest purit s traceable tions. pressing t pressing t	y raw to NII D.C. (ess otherwise stated. materials are used in ST (see above). ST (see NIST 2994).	vise st are us bove). of NIST	ated. ed in						

Part # 58024 Lot # 060523

Absolute Standards, Inc. 800-368-1131	цс.				ertified F	leference.	Certified Reference Material CRM	MF			AF	ANAB ISO 17034 Accredited AR-1539 Certificate Number	Accredited te Number
www.absolutestandards.com					MSU	M5697	R C 10	10/23/23			https	https://Absolutestandards.com	dards.com
CERTIFIED WEIGHT REPORT: Part Number: Lot Number:	mber: mber:	58029 102523				Lot # 24002546	Solvent: Nitric Acld				11		
Expiration Date: Recommended Storage:	piration Date: rded Storage:	CODDET (CU) 102526 Ambient (20 °C)	Cul			2.0%	40.0 (mL)	Nitric Acid	Formulated By:	Ber	Benson Chan	102523	0
Nominal Concentration (Jg/mL): 1000 NIST Test Number: 6UTB Volume shown below was diluted to (mL):	ig/mL): Imber: elow was di	1000 6UTB liuted to (mL):	2000.02	5E-05 0.058	Balance Uncertainty Flask Uncertainty	uinty v			Reviewed By:		Pedro L. Rentas	102523	
Compound	Part Number	t Lot ber Number		Initial Vol. (mL)	Initial Uncertainty Vol. (mL) Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	Solvent S CAS# OSF	SDS Information nt Safety Info. On Attac OSHA PEL (TWA)	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	NIST SRM
1. Copper(II) nitrate trihydrate (Cu)	58129	29 100223	0.1000	200.0		1000	10000.1			10031-43-3	1 mg/m3	ori-rat 794 mg/kg	3114
1.0E6	[1] Spectrum No.1	No.1	33.422 sec]:58029.]:580	29.D# [(D# [Count] [Linear]	inear]						
5.0E5													
m/z->	6	N.	0 N	21 52	40	20	09	Q 	80		0	100	
2.5E7													
Π/Z-> 2.0E7	0	120	130	<u> </u>	140	150	160	170	00		180	500	
1.0€7													
<-2/m	٥ 10	550	530		240	250	560						
Part # 58029 Lot # 102523	g					1 of 2				Printed: 1	Printed: 10/26/2023, 1:20:31 PM	1:20:31 PM	

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



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



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	<0.02	3	<0.02	Dy	<0.02	Hf	≤0.02	E	<0.02	ž	<0.02	Ł	<0.02	3	⊲0.2	2	40.02	M	2002
	≤0.02	ű	40.2	Ъ	<0.02	Ho	<0.02	Ē	<0.02	£	<0.02	Re	<0.02	S	<0.02	Te	<0.02	Ð	<0.02
s	40.2	ല്	<0.02	岛	<0.02	ц,	40.02	Mg	10.0>	ő	<0.02	Rh	<0.02	Ag	<0.02	F	<0.02	>	2002
Ba	<0.02	ඊ	<0.02	3	<0.02	4	<0.02	Мп	<0.02	Pd	<0.02	Rb	0.02	N ⁸	<0.2	Ê	<0.02	Ś	2002
63	<0.01	ບ່	<0.02	5	<0.02	Ł	<0.2	Нg	<0.2	4	<0.02	Ru	<0.02	š	20 D2	Ē	80	; >	200
	<0.02	ථ	<0.02	ප්	<0.02	La	<0.02	Mo	<0.02	£.	<0.02	Sm	20.02		000	5		1	
_	<0.02	õ	H	Au	<0.02	£	<0.02	PN	40.02	×	402	8	40.02	μ	20.02	3 12		3 8	

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 ($\frac{1}{4}$ /-) 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	ds, Inc.			Ċ	rtified Re	ference M	Certified Reference Material CRM	5			AP	ANAB ISO 17034 Accredited AR-1539 Certificate Number	Accredited ate Number
www.ausolutestartaatus.				MS	5698	de la	10/23	23		6	http:	https://Absolutestandards.com	ndards.com
CERTIFIED WEIGHT REPORT:	EI.					Lot #	Solvent:						
	Part Number: Lot Number: Description:	<u>58025</u> 102623 Menrenese (Mn)	(Min)			24002546	Nitric Acid		M.	Core C			
	· lond-loop		11111 20			2.0%	60.0	Nitric Acid	Formulated By:		Benson Chan	102623	122
ш	Expiration Date:	102626					(mL)		0		0		1
Recommended Storage: Mominal Concention (univer)	Recommended Storage:	Ambient (20 °C)	, C)						H	to R	ento	1	
	NIST Test Number:	6UTB		5E-05 B	Balance Uncertainty	inty			Reviewed By:		Pedro L. Rentas	102623	23
Volume	Volume shown below was diluted to (mL):	s diluted to (mL):	3000.41	0.058 F	Flask Uncertainty	٨		ų					1
		Part Lot	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Expanded Uncertainty	(Solven	SDS Information (Solvent Safety info. On Attached pg.)	ation n Attached pg.)	NIST
Compound	Z	Number Number	Factor	Vol. (mL)	Vol. (mL) Pipette (mL) (Conc. (µg/mL)	Conc. (ug/mL)	Conc. (µg/mL)	+/- (//d//mL)	CAS# (OSHA PEL (TWA)) LDSO	SRM
1. Manganese(II) nitrate tetrahydrate (Mn)		58125 071123	0.1000	300.0	0.084	1000	10000.1	1000.0	2.1 2	20694-39-7	5 mg/m3	ort-rat >300mg/kg	g 3132
	[1] Spectrum No.1	-	34.243 sec]:57025.	c]:5702		D# [Count] [Linear]	ear]						
9.0E9													
2.2 2													
~->/w	0	20	30		40	0	00	20	8		08	100	
1,0E8													
5.0E7													
K-N/E	110	120	130		140	150	160	170	180		180	200	
0.7													
<-z/ш	210	550	230	.,	240	250	560						
Part # 58025 Lot #	Lot # 102623					1 of 2				Printed:	Printed: 10/26/2023, 1:20:32 PM	1:20:32 PM	

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Certified Reference Material CRM



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

		Contraction of the second	のなる日本に見たれ	CONTRACTOR NO.	Contraction of the second seco	NAME OF ADDRESS OF ADD	The state of the second	All and the second	A PARTY AND A PART	Strengthered.									
-	<0.02	3	<0.02	P _V	<0.02	H	<0.02	Li	40.02	ïŻ	<0.02	虚	<0.02	8	40.2	P.	40.02	M	<0.02
Sb	≤0.02	บ็	<0.2	Щ	<0.02	Ч	<0.02	1	≤0.02	ę,	<0.02	Re	<0.02	Si	<0.02	ę	≤0.0≥	. 5	<0.02
S	40.2	రి	<0.02	ឝ	<0.02	ų	<0.02	Mg	0.01	ő	<0.02	Rh	<0.02	Ag	<0.02	F	<0.02	>	<0.02
es es	<0.02	ű	<0.02	3	<0.02	Ч	<0.02	Wn	Ŀ	Pd	<0.02	Rb	<0.02	Na BN	407 1	Ē	<0.02	ę,	20.02
Ð	10.0>	ප්	<0.02	ő	<0.02	Fe	<0.2	Hg	<0.2	۵,	<0.02	Ru	<0.02	Sr.	<0.02	Ta	<0.02	>	2002
÷	<0.02	ර	<0.02	පී	<0.02	Ľa	<0.02	Mo	<u>40.05</u>	×.	<0.02	Sm	<0.02	ŝ	≤0.02	Sn	<0.02	Zu	20.02
~	<0.02	õ	≤0.02	Au	<0.02	Чd	<0.02	PN	≤0.0>	×	<0.2	Š	<0.02	ea H	0.02	F	40.02	72	<0.02

Physical Characterization:

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

Certified by:

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

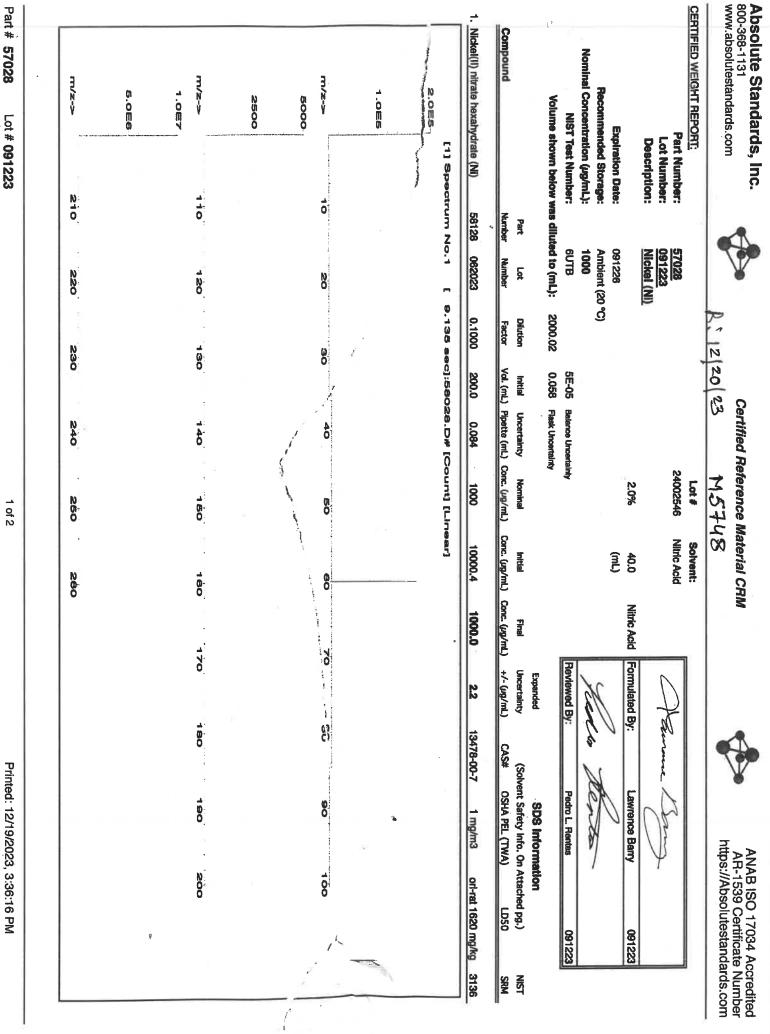
the balances that are calibrated with weights traceable to NIST (see above).

* 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).

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
250			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 ションンクロン MSチムチ
			0 180 190			8. 0			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	Keller Hen	Formulated By: Lawrence Barry	Admond Ba		*
			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

	DEFF12: 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 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.absol



Part # 57028 Lot # 091223 2 of 2		 * Purified acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are 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). 	Homogeneity: No heterogeneity was observed in the preparation of this standard.	(T) = Target aria/vie	AI A02 Cd A02 Dy A02 H A02 N T Pr A02 S A02 C4 A02 E A02 H A02 Li A02 N T Pr A02 S A02 C4 A02 E A02 H A02 Li A02 N T Pr A02 S A02 C4 A02 E A02 H A02 Li A02 N A02 N <t< th=""><th>Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS): Trace Metals Verification by ICP-MS (µg/mL)</th><th>www.absolutestandards.com</th></t<>	Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS): Trace Metals Verification by ICP-MS (µg/mL)	www.absolutestandards.com
			et .	2	Tb 40.02 Te 40.02 TI 40.02 Th 40.02 Sn 40.02 Ti 40.02		
	5 		P. S.	Certified by:	W -0.02 U -0.02 V -0.02 Yb -0.02 Yb -0.02 Yb -0.02 Zn -0.02 Zr -0.02 Zr -0.02		AR-1539 Certificate Number https://Absolutestandards.com

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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]		
5. 0 M 6 7					
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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		Inc



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	h	<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	cn	<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



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

Certified Reference Material CRM



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							Trace M	letals	Verification	ition	by ICP-MS		(ng/mL)							_
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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:

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

- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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- Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
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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
		9 4			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
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_	40.02	లి	≤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
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_	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 sec]: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

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		5.068
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		1.0臣4
[Linear]	4o.1 [12.275 sec]:58105.D# [Count] [Linear]	[1] Spectrum No.1 2.0E4
11.55772 11.56201 1000.4 2.0 10043-35-3 2 mg/m3 orl-rat 2660 mg/kg	IN018 BV082016A1 1000 99.9988 0.10 17.3 11.5	1. Boric acid (B) IN018 E
Expanded SDS Information Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50	Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%)	Compound RM#
	1000 4R	
Reviewed By: Pedro L. Rentas 071123	6UTB 5E-05 Balance Uncertainty	Nominal Concentration (µg/mL): 1 NIST Test Number: 6
40.0 Ammonium hydroxide Formulated By: Benson Chan 071123	(B) 2.0%	
Solvent: MKBC8597V Ammonium hydroxide	57005 Lo 071123	CERTIFIED WEIGHT REPORT: Part Number: 5
ce Material CRM ANAB ISO 17034 Accredited M 5종14 주가 5종14	Certified Reference Material CRM	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com



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	tals	S Verifica	tion	by ICP-	Ś	(µg/mL)						
S S A	40.02	0 2 2 2 2 2	40.02	Er Dy	<0.02	Ho	4).02	臣	40.02 002	A N	40.02 20.02	R 7	A A 8 8	s: %	A ()	3 3	2 A 3 R	: ¥	40.02
	_	n (1		2 8	A	- 5		Mg	<0.01	õ	<0.02	Rh	<0.02	Ag	40.02	3	6 8 8	< 0	40.02
		다. 	A 0.02	ត្ន ខ្ល	40.02	न ⊧			20.02	3 R	40.02	R	<0.02	Na	40.2	Ţ	40.02	₽¥	<0.02
_	_	6	<0.02	ନ୍ନ	<0.02	5			3 6	7	20.02	, Ku	40.02	Sr	<0.02	Тв	<0.02	×	<0.02
		¥	<0.02	Au	<0.02	3		N a	32	4 3	<0.02	2	40.02	1 60	40.02	S	-0.02	Za	<0.02
						I		ļ			101	ą	2000	La	20.02	11	20.02	N	40.02

(T) = Target analyte

Physical Characterization:

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In P. Str

Certified by:

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

Part #: 57005 Lot # 071123

$\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		۵. 0		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 (800-368-1131 www.absolute	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	lards , ds.com	Inc.	-				ĉ	rtified Re	eren	Certified Reference Material CRM	ial CR	M					https AF	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	4 Accredited cate Number andards.com
-	nstrum	iental A	nalysi	s by Indi	uctive	ły 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	8	40,02	Ą	40.02	H	40.02	E	A) ()2	Z	A)22	7	A).02	Se	A 2	ŧ	AB	W		
		A.22	5 2	A0.2	ម្មា	40.02	Но	40.02	Ŀ	40.02	NB	<0.02	Re	40.02	ŝ	40.02	Te	40.02	c :	40.02	
	Ba		<mark>ዮ</mark> የ	8 8 8 8	<u>ନ</u> ଜ	40.02 20	부 부	40.02 20	Mg	40.01 002	r S	A A 3 2	₽ ₽	A A 3 S	Å.	A0.02	1 11	A 600	\$ <	8 8	
		10.0>	ព្	40,02	ណ្ឌ	<0.02	장	<0.2	Hg	40.2	שי	T	R Q	40.02	K 2	8.8 4		<0.02	4 'B	60.02 20.02	
	B	8 8 22 22	5 S	8 8 22 22	ନ ବ	40.02 20	32	4 4 A	N W	4 4 8 8	* 7	A0.02	s s	A A 3 S	, s	88	1 S	A A A A	2 B	88	
										(T)= Ta	(T)= Target analyte	alyte			ĺ						
hand	hysical	Physical Characterization:	cteriza	ution:														Cer	Certified by:	y:	
	Iomogen	eity: No I	heteroge	neity was	observ	ed in the pr	eparati	Homogeneity: No heterogeneity was observed in the preparation of this standard.	ındard.								(h	J.	Ŵ	
* *	The cel Purified	rtified va l acids,	alue is 18.2 m	The certified value is the concen Purified acids, 18.2 megohm dei the menaration of all standards	centrat deioniz	tion calcul red water,	lated 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 etandarde	metric s A gla	and volu	metric nd the	measure highest p	nents Jurity r	unless oth aw mater	nerwisc ials are	e stated. 9 used in					
* * * * *	All star Standa Standa All Star Uncerta Measur	ndard co rds are rds are ndards s ainty Re rement	ntaine prepare certife hould I ference Result,	rs are me ad gravin d (+/-) 0 es storec e: Taylor " NIST Te	eticulo netrica).5% o d with r, B.N. echnic	ally using the stat caps tigh and Kuya al Note 1;	hed pri balanc iced val it and it, C.E. 297, L	 * 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 calit other ropriat nes for nment	brated wit wise stat te laborat Evaluatir Printing (h weig ed. ory co Office,)hts trace onditions. Expressir Washingt	able to og the l on, D.(to NIST (see above). e Uncertainty of NIST D.C. (1994).	e abov ty of N	e). IIST					
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Part #	57115		Lot # 041723	1723							2 of 2	of 2					Print	Printed: 2/8/2024, 5:01:22 PM	24, 5:0)1:22 PM	

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m/z->	N. 01 00	5. O M 8	m/z->	5.0E7	1.0E8	m/z->	N. 00 00	5.0E5	Ammonium sulfate (S)	Compound	NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	Part Number: Lot Number: Description:	800-368-1131 www.absolutestandards.com
210			110			10		[1] Spectrum No.1	IN117	RM#	umber: low was dilute	n Date: lorage: lg/mL):	<u>Part Number:</u> Lot Number: Description:	
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N80			0			8		9 9 7	16.4980	Actual Weight (g)			ASTM Type 1 Water	aterial CRM
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			180			80			2.0 77	Expanded Uncertainty +/- (µg/mL)	Reviewed By:	M	Formulated By:	
						 Complete and complete 			7783-20-2	(Solvent : CAS# 05	Pedr	\$	a and a second sec	
			190			0			NA	SDS Information It Safety Info. On Attac OSHA PEL (TWA)	Pedro L. Rentas	e la	Benson Chan	http
			2000			100			ort-rat 4250mg/kg 3181	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	122923	7	100002	AR-1539 Certificate Number https://Absolutestandards.com

Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).	 * All standard containers are meticulously cleaned prior to use. * 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. * 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 	 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 		Homogeneity: No heterogeneity was observed in the preparation of this standard.	Physical Characterization:	(T) = Target analyte	AI A002 Cd A002 Pr A002 Pr	Trace Metals Verification by ICP-MS (µg/mL)	Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
30			5 2	I She	Certified by:		MI MI<			ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

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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
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800-368-1131 www.absolutestandards.com		0	Certified Reference Material CRM	nce Material C	RM			•	ANAB ISO 1: AR-1539 Ce https://Absolut	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	ictively Coupled	Plasma Mass Sp	ectrometry (IC	P-MS):						
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Physical Characterization:			(T)= Target analyte	alyte				۲ ۲	Certified by:	
Homogeneity: No heterogeneity was observed in the preparation of this standard.	oserved in the prepa	ation of this standard								1
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 * 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 meticulously cleaned prior to use the preparation of the preparation of all standards. 	ntration calculate ionized water, ca	d from gravimetri librated Class A g	c and volumetric lassware and the	c measurement highest purity	s unless otherwise stated. raw materials are used in	ise state are used i	5.6			
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* Uncertainty Reference: Taylor, Measurement Result," NIST Tec	vith caps tight ar B.N. and Kuyat, (hnical Note 1297	id under appropria 2.E., "Guidelines fc , U.S. Governmen	ite laboratory co r Evaluating and t Printing Office,	I Expressing the Washington, D	⁹ Uncertainty of NIST).C. (1994).	F NIST				
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* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to * 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 Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.	itrically using bail trically using bail is of the stated with caps tight ar B.N. and Kuyat, (hnical Note 1297	prior to use. ances that are cali value, unless othe d under appropria 2.E., "Guidelines fo , U.S. Governmen	brated with weig rwise stated. re laboratory co or Evaluating and t Printing Office, t Printing Office,	ghts traceable . onditions. I Expressing the Washington, D	to NiST (see ab 3 Uncertainty o).C. (1994).	ove). F NIST				

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Certified Reference Material CRM A: 12: p 4: 2.4 Ph/SI R Solvent: 24002546 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 40.0 2% 1140 1140 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.865 111 12.9 111 12.9 111 12.9 111 13.865 111 14.0 111 14.0 111 14.0 111 11.9 <th></th> <th></th> <th></th> <th></th> <th></th> <th>Lot RM# Number IN009 SID082022A1</th> <th>s dilute</th> <th>mber: mber: ption:</th> <th>, Inc.</th>						Lot RM# Number IN009 SID082022A1	s dilute	mber: mber: ption:	, Inc.
Instant Image: Constraint of the con	≥40		140	4	1.393 sec]:58014.D# [Count]	Purity Uncertainty Assay (%) Purity (%) (%) 99.999 0.10 14.4	2% 5E-05 Balance Uncertainty 99.48 0.058 Flask Uncertainty		Certified Reference
v: Aleah O'Brady V: Aleah O'Brady CAS# OSHA PEL (TM 919-19-0 2.5 mg/m: 919-19-0 150	N		160	0- 	Linear]	Actual Actual Weight (g) Conc. (Jy/mL) 13.8855 1000.0	Nitric Acid	Nitric A	182
			(*)			(Solvent S CAS# () 18919-19-0	Ped Ped	ha	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

≤ % >



Certified Reference Material CRM



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

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

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(T) = Target analyte

Physical Characterization:

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

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

* All standard containers are meticulously cleaned prior to use.

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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):

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(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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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

Image:	TT/Z->	2500	5000	m/z->	500	 1000	N.00 M.4	5.0E4	1. Ammonium dihydrogen phosphate (P) IN008 PvœzoisAi	Compound	Weight shown below was diluted to (mL):	NIST Test Number:	Recommended Storage: Nominal Concentration (ug/mL):	Expiration Date:	Lot Number: Description:	CERTIFIED WEIGHT REPORT: Part Number:	www.absolutestandards.com
ric Acid Fic Acid Formulated By: Formulated				120		20				Lot Number							R
ric Acid Fic Acid Formulated By: Formulated	240			140		40			89.899 0.10 27.5 7.275	Purity Uncertainty Assay (%) Purity (%) (%)	0.058 Flask Uncertainty	5E-05 Balance Uncertainty					00
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					e). IST	rials are e abov ity of N	ity raw materials are us le to NIST (see above). the Uncertainty of NIST , D.C. (1994).	able to g the l on, D.(highest p ts trace; ditions. Xpressin Vashingt	id the f id. yry con y and E ffice, V	sware ar ated with ise state laborate ivaluation rinting O	A glas calibr otherw opriate is for E ment P	ed Class to use. that are , unless (der appro Guideline Governr	calibrat ad prior alances d value and un , C.E., " 97, U.S	d water, sly clean y using b y using b the state the state hps tight nd Kuyat Note 12	eionize Is. ticulou: ticulou: 5% of 1 S% of 1 B.N. a chnical	 Purmed 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). 	8.2 me of all s repared ertifed ertifed prence: esult,"	acids, 1 aration s are pi s are ci ards sh nent Refe	 Purmed acids, 18.2 meg the preparation of all si All standard containers Standards are prepared Standards are certifed (All Standards should be Uncertainty Reference: Measurement Result," Measurement Result, " Measurement Result," 	* * * * * *
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QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

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

- **APPLICATION:** For use with the CLP SFAM01.0 SOW and revisions.
 - CAUTION: Read instructions carefully before opening bottle(s) and proceeding with $\frac{1}{2}$ M5528 - 3 M5528 - 3 M553 - 3130 123 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

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 µg/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

RMs ICV 1, 5, 6 SFAM (1)

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"

APTIM	Instructions for a reason
ICV1-1014	Instructions for QATS Reference Material: Inorganic ICV Solutions
	For 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.
ICV5-0415	For 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) K ₂ Cr ₂ O ₇ and 5% (v/v) nitric acid.
	For 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 $K_3Fe(CN)_6$, 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)
AI	2500	(after 50-fold dilution)
Sb	1000	500
As	1000	200
Ba	520	200
Be	510	100
Cd	510	100
Ca	10000	100
Cr	520	2000
Co	520	100
Cu	510	100
Fe	10000	100
Pb	1000	2000
Mg	6000	200
Mn	520	1200
Ni	530	100
K	9900	110
Se	1000	2000
Ag	250	200
Na	10000	50
TI	1000	2000
V	500	210
2n	1000	100
	1000	200

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

	m/z-> 210	1.0E8	N. O E B	m/z-≻ 110	-1 -0 	m/z-> 10 2.0E8	1.0 [[]4	[1] Spectrum No.1 2.0E4	1. Selenium (Se)	Compound	Volume shown below was diluted to (mL):	Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	Lot Number: Description:	CERTIFIED WEIGHT REPORT:	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
	0			o		J.		um No	58134	Part Number	6 as diluted			л	
220				120		12 0		-	071223	Lot Number	ed to (mL):	060627 Ambient (20 °C) 1000	<u>060624</u> Selenium (Se)	7024	V
	N			4		ω		33.702	0.1000	Dilution Factor	2000.07	ĉ	(Se)		
	230			130		80		90C]:58	200.0	Initial Vol. (mL)	5E-05 0.100				
	240			140		4 0		034.D#	0.084	Initial Uncertainty Vol. (mL) Pipette (mL)	Balance Uncertainty Flask Uncertainty				Sertified Referen
	250			150		. (л О		33.702 sec]:58034.D# [Count] [Linear]	1000	Nominal Conc. (µg/mL)	rtainty nty		2.0%	Lot #	Reference 162.
	260			160		60		inear]	10002.5	Initial Conc. (µg/mL)		(mL)	40.0	Solvent:	Certified Reference Material CRM からすチェート・アンの
				170		70			1000.0	Final Conc. (ug/mL)	11		Nitric Acid		114
				ŏ		0			2.2	Expanded Uncertainty +/- (µg/mL)	Reviewed By:	<i>M</i>	Formulated By:		24
				180		80			7782-49-2	0	×	20	BY		
				190		90			0.2 mg/m3	SDS Information nt Safety Info. On Att: OSHA PEL (TWA)	Pedro L. Rentas		Benson Chan		ਤ
				200		100			3 orl-rat 6700 mg/kg	SDS Information (Solvent Safety Info. On Attached pg.) AS# OSHA PEL (TWA) LDS0	1tas 060624	,	n 060624		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
									3149	NIST	24	I	24		Accreditec ate Number Idards.com

															1
	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).	The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise st. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are us 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).	rements t purity r ceable to s. s. sing the l ngton, D.0	highes highes tra ndition: Expres Washir	volumetric re and the i with weij stated. stated. oratory cc uating and ing Office.	ric and glasswa glasswa alibratec nerwise riate lab for Evalu nt Print	 * The certified value is the concentration calculated from gravimetric and volumetric measurements unlee * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw n 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 NIS * 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 Unce Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1 	ed fron alibrate alibrates lances l value, l value, C.E., "Q C.E., "Q C.E., "Q	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., "Guidelin Measurement Result," NIST Technical Note 1297, U.S. Gover	ntratio sionized s. etrically etrically 5% of t 5% of t B.N. a B.N. a	he conce egohm de standardd s are met d gravim (+/-) 0. e stored : Taylor, NIST Tev	alue is t 1 8.2 me n of all : ntainer: orepare certifed bould bu ference ference Result,"	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	* The c * Purifie the purifie * All stand * Stand * All stand Measu	
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com		₽M	terial Cl	nce Ma	Certified Reference Material CRM	Certifie					Inc.		Absolute Standards, 800-368-1131 www.absolutestandards.com	Absolute 800-368-1131 www.absolute	800-



Part# 57003 Lot # 062124	 * The certified value is the concentration calculated from gravimetric and volumer * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and 1 the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravinetrically using balances that are calibrated with w * Standards are certified (+/) 0.5% of the stated value, unless otherwise stated. * All Standards should be stored with caps tight and under appropriate iaboratory * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating of Measurement Result," NIST Technical Note 1297, U.S. Government Printing Off 	Homogeneity: No heterogeneity was observed in the preparation of this standard.	Physical Characterization:	Al 40.02 Cit 40.02 Dr 40.02 Hd 3b 40.02 Cit 40.02 Ein 40.02 Hd As 40.2 Cit 40.02 Ein 40.02 In Ba 40.02 Cit 40.02 Gd 40.02 In Ba 40.02 Cit 40.02 Ge 40.02 In Ba 40.02 Cit 40.02 Ge 40.02 Ia		Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):	Absolute Standards, Inc. 800-368-1131 www.absolutiestandards.com
2 01 2	 * 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 standard. * 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 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. * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All Standards broud by stoud with cases tight and under appropriate laboratory conditions. * All Standards are prepared with cases tight and under appropriate laboratory conditions. * Mucertainty 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). 	this standard.		40/02 Li T Nh 40/02 Hr 40/02 And 40/02 Li An	-MS (µg/mL)	Mass Spectrometry (ICP-MS):	Certified Reference Material CRM
Printed: 6/24/2024, 11:20:08 PM	Ъ.	Sur P. S.	Certified by:	Site Gall Tite Gall U Gall Site Gall Site Gall U Gall Gall Site Gall Gall <thgall< th=""> <thgall< th=""> Gall<td></td><td></td><td>ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com</td></thgall<></thgall<>			ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Page 1 of 4

ក⁰⁸ = ក្រុងអាស់ ដែល ភ្លេង ភ្ល

Z = 1000BL = $\sup_{x \in \mathcal{A}} (\pi_x) = O_{CRM/RM} = k \left(u^2_{Char} + u^2_{T}_{bb} + u^2_{T}_{bb} + u^2_{T}_{bb} + u^2_{Cb} \right)^{1/2}$ $\mathsf{M}^{i} = (1/\mathsf{n}^{\mathsf{clust}\,i})^{\Sigma} \setminus (\Sigma(1/(\mathsf{n}^{\mathsf{clust}\,i})_{\Sigma})$

nieneity standard uncertain ucherts mort arone enti = a fanta lisnegomort ettod, of ettod = dd^u adnere vitidats mot gnot = _{ad}t $\label{eq:spinor} \min \left\{ x \right\} = U_{CRM/RM} = k \left\{ u^2_{char} * u^2_{bb} + u^2_{bb} + u^2_{bb} + u^2_{bb} \right\}^{4}$

$$\begin{split} \chi_{CRM,FRM} = & (\chi_{o}) \; (u_{char, o}) \\ \chi_{a} = mean of Assay Method A with ut and a charter of the standard uncertainty of uncertainty of the standard uncertainty$$

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

Certified Value, X_{CRMMM}, where two or more methods of characterization are used is the weighted mean of the results: Characterization of CRM/RM by One Method Characterization of CRM/RM by Two or More Methods

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent to following equations are used in the calculate/K=2.

traceability. - The Calculated Value is a value calculated from the weight of a starting material that has been cartified idrectly vs. A National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance starting.

ICP Assay NIST SRM 3162a Lot Number: 130925 1002 ± 4 hg/mL

Pssay Method #1

g = Jojoej

un pepuedra w

(1x) (1w) = X(wi) (xi)

:noiternotnl ysseA

1.012 g/mL (measured at 20 ± 4 °C) Density: 1002 ± 5 µg/mL sulsV beitified

 $\chi_q = mean of Assay Method I with standard uncertainty updat 1$ w₁ = the weighting factors for each method calculated using the tothe weighting actions for each method with the second standard stan

CERTIFIED VALUES AND UNCERTAINTIES 3.0

Starting Material Purity: 99.9975% Starting Material Lot#: 2094 Starting Material: In Metal unineti l 1 000 hg/mL ea: :(s)ətylanA \ əulsV :xinteM

tr. HF 2% (v/v) HNO3 27991717-2T Lot Number: **LITED** Catalog Number: Product Code:

Single Analyte Custom Grade Solution

PRODUCT DESCRIPTION 0.S

Number QSR-1034).

the Competence of Reference Material Producers" and ISO/IEC 17025, "Ceneral Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Vantures is also an ISO 9001 registered manufacturer (QSR Certificate Inorganic Manuel 2014) INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for



ACCREDITATION / REGISTRATION 0.r

300 Technology Drive Christiansburg, VA 24073 USA Christiansburg, VA 24073

R:2/22/24

info@inorganicventures.com E: 240-282-3015 E: 240-282-3030

Refine your results. Redefine your industry. Certificate of Analysis 6657 'SLEST

4.0 TRACEABILITY TO NIST

sbecueq. - This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRMRM uncertainty error and the measurement, weighing and volume dilutiton errors. In rare cases where no NIST SRMRM are available, the term "in-house std.' is a provided.

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

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)

.my €.0 a2 M 0732£0.0 > ⊨N O 832000.0 > ⊔∃ M 8€2000.0 > ⊵A M ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to CRMRMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS, were analyzed in an up of the method for each element of the property effection of the method for the met

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			9	0:000536	>	٩٨	Μ	0.004900	>	эS	0	477000.0		oM	Μ	892000.0	>	ΞL	Μ
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			1	0.000473		M	Μ		>	S	- į	0.005445	>	БM	0	068010.0	>	ng	0
			9	98610.0	>	Λ	Μ	0.000269	>	nЯ	Μ	0.000268	>	nŋ	Μ	0.000268	>	sÖ	M
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792600.0	>	uΖ	0 \$	0.00120		əS	Μ	0.032670	>	вN	0	0.000268	>	nΞ	Μ	0.000536	>	₿¥	M

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

- For the calibration of analytical instruments and validation of analytical methods as appropriate. 9.0 INTENDED USE

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

Page 2 of 4

Page 3 of 4

- Chemical Testing - Accredited / A2LA Certificate Number 883.01 "serveter of the second sec

- QSR Certificate Number QSR-1034

nottertizigeA metevs inemegeneM villsuD 100e OSI 1.01

WOITATNEMUDOD GRADNATS YTILAUD

0.01

Homogeneity data indicate that the end user should take a minimum server of 0.2 m L or 2.0 m L or 2 - This solution was more according to the superior superior of the form as the solution of the homogeneous. المستحدم المرابعة الم .viienegeneity.

Please refer to the Safety Data Sheet for information regarding this CRMRM. HOMOGENEITY 0'6

NOITAMAORNI SUOGAASAH 0.8

۲۹۸۱۵۵۲۹۵۵) ۱۹۸۱۶۵۶ ۲۲۵۶۵ (۱۹۹۵۶۵ ۲۲۵۶۵ ۱۹۵۱ ۱۹۵٫۱۶۵۲۵۵ ۱۹۵٫۱۶۵٬۵۲۱		100 (0054 / 0.00092 µg/mL 0.0054 / 0.00092 µg/mL 1m/gµ 4£0000.0 / 6500.0 10 N0 fe prepared or stored ii 10 N0	CP-OES 323.452 nm ICP-OES 334.941 nm ICP-OES 334.941 nm ICP-OES 336.121 nm ICP-OES 356.121 nm
SET Interferences (underlined indicates severe) 32S160, 32S14N,	Orde A/N	14 pt	UCP-MS 44 amu

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view): **Technique/Line**

1:1:1 H2O / HF / H2SO4 or fuse ash with pyrosultate it oxide is as plastic pigment and likely in prookite Notentity: Oxde - low temperature history and sortanty - ineer (sortant in 122) in source heads Notentity: Oxde - low temperature history (-800EC) brookite (fuse in Pto with KS2207); Ores (f TI Containing Samples (Preparation and Solution) - Metal (Soluble in H2O / HF caution -powder reacts violentino: Ovide , Iour Inergene , or entile (Discoluted by Inergene) and Ferdinal Market (Soluble In 1997).

HINGS / LOPE corporations of an LOPE contained, while all solutions as the TI(F)6-2 chemically stable for years in HNOS / Lope container. 1-10,000 ppm single element solutions as the TI(F)6-2 chemically stable for years in TI Containing American and Solutions. 1-Metal (Solution in 2000) the solution and Solutions are the TI(F)6-2 chemically stable for years in 1.000 ppm single element solutions. 1-Metal (Solution in 2000) the solution and Solutions are the TI(F)6-2 chemically stable for years in 1.000 ppm single element solutions. 1-Metal (Solution in 2000) the solution and Solutions are the Solution and Solutions. 1-Metal (Solution in 2000) the solution are the solution and solutions. with a fendency to hydrolyze forming the hydrafied oxide in all dilute acids except HF. **Stability -** 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)6-2 for months in 1% HNO3 / LDPE container. 1-10.000 point and element solutions as the Ti(F)6-2 chemically stable for year media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of thansition elements unless they are fluorinated). Stable with more inorganic anions with a tendency to hydrolyze forming the hydrafed oxide in all dilute acids except HF. Chemical Compatibility - Soluble in concentrated HCI, HF, H3PO4 H2SO4 and HVO3. Avoid neutral to basic S-8(T)T 6 4+ 78.74 - noiluite in Solution (Chemical Form in Solution - 47.74 6 T(F)6-5-- For more information, visit www.inorganicventures.com/TCT Afomic Weinher Valence: Coordination Winnher: Chemical Equa

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

Page some more served to the served to the served to the organization of the concentration(s). It is be the responsibility of the user to account for this effect. When the bottle is weighed both before and after being the responsibility of the user to account for this effect. When the bottle is weighed both before and after being the rescaled to the test to account for this effect. When the bottle is weighed both before and after being the rescaled to the test to account for this effect. When the bottle is weighed both before and after being the rescaled to the test to account for this effect. When the bottle is the active the bottle is weighed both before and after being the rescaled to the test to account for this effect. When the bottle is the rescaled to the test to account to the test to the test to account to the test to the test to account to the test to - While stored in the sealed TCT bag, transpiration of this CRAWRM is negligible. After opening the sealed TCT had transmission of the CDMMAN will occur recutification increase in the source concentration of the is

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

Page 4 of 4

Certifying Officer:

Chairman / Senior Technical Director

NOS Paulo 182

Paul Gaines

-

Thomas Kozikowski Manager, Quality Control

Certificate Approved By:

0.2r

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

- 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.

- Sealed TCT Bag Open Date:

11.3 Period of Validity stability studies conducted on property stored and handled CR/WRMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

- The lot expiration date reflects the period of time that the stability of a CRMMM can be supported by long term

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

- June 17, 2027

11.2 Lot Expiration Date

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

June 17, 2022

11.1 Certification Issue Date

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY 0.11

norganic Ventures, 300 Technicky Drive, Christianeburg, Ve. 24073, USA; Telephone: 800,669,678; 540,585,3030, Fax: 540,562,5015; Innegan

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

ADSOIUTE STANDARDS, INC. 800-368-1131 www.absolutestandards.com			U	ertified I	Referen	ce Mate	Certified Reference Material CRM	C	1117		•	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	ANAB ISO 17034 Accredited AR-1539 Certificate Number ttps://Absolutestandards.com	ccredited Number ards.com
הבמדובובה אובותווד מרמסמד.							4		20	2				
CENTIFIED WEIGHT NET ON	<u>57038</u> 031524			Solvent:		24002546	Nitric Acid				1			
Description:	Strontium (Sr)	(Sr)			700		Nitrio Acid		Comulated Bur	N Dr.	Boncon Chan	to manual state	031504	
Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	031527 Ambient (20 °C) 1000	ŝ					Nume Acid			apy.	Denson crian	La	120100	
NIST Test Number:	6UTB		5E-05 B	5E-05 Balance Uncertainty	uinty				Reviewed By:	By:	Pedro L. Rentas	as	031524	
Weight shown below was diluted to (mL): Lot <u>Compound</u> RM# Number	Is diluted to (mL): Lot RM# Number	2000.07 Nominal Conc. (µg/mL)	0.100 Purity (%)	0.100 Flask Uncertainty Purity Uncertainty Assay (%) Purity (%) (%)	say ()	Target Weight (g) V	Actual Weight (g) C	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDS	SDS Information Safety Info. On Attachee SHA PEL (TWA)	d pg.) LDSO	NIST SRM
1. Strontium nitrate (Sr)	IN017 SRZ022018A1	1000	68.997	0.10	41.2 4.8	4.85470	4.85502	1000.1	2.0	10042-76-9	NA	orl-ra	ori-rat >2000mg/kg 3153a	3153a
5.0E6	-	14.495 sec]:58138.D# [Count] [Linear]	ec]:581	38.D#[Count	[Linear								
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oart # 57038 Lot # 031524					Ť	1 of 2				Pri	Printed: 6/7/2024, 3:58:42 PM	4, 3:58:42 F	Wo	

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



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

							Trace M	letals	Verification	ation	by ICP-MS		(ng/mL)						
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As	<0.2	ථ	<0.02	Ē	<0.02	ä	<0.02	Mg	±0.0	ő	<0.02	Rh	<0.02	Ag	<0.02	F	<0 0>	>	89
Ba	<0.02	ű	<0.02	3	€0.02	ч	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	ž	<0.2	É	2007	- 5	
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Physical Characterization:

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

Certified by:

Sur ?

* 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).

1. P 5 * 1980 246 196 **4**• . 12 M 8: 2 1.481¥ *:

-3



1 of 1



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









Material No.: 9530-33 Batch No.: 24D1562005 Manufactured Date: 2024-03-18 Retest Date: 2029-03-17 Revision No.: 0

Certificate of Analysis

Test	Specification	Result
ACS – Assay (as HCl) (by acid-base titrn)	36.5 - 38.0 %	37.6 %
ACS – Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS - Specific Gravity at 60°/60°F	1.185 - 1.192	1.192
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS – Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS – Free Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO4)	≤ 0.05 ppm	0.03 ppm
Sulfate (SO4)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO3)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH4)	≤ 3 ppm	< 1 ppm
Trace Impurities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities - Aluminum (AI)	≤ 10.0 ppb	< 5.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities – Barium (Ba)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Boron (B)	≤ 20.0 ppb	2.2 ppb
Trace Impurities – Cadmium (Cd)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	31.0 ppb
Trace Impurities – Chromium (Cr)	≤ 1.0 ppb	0.5 ppb
Trace Impurities – Cobalt (Co)	≤ 1.0 ppb	0.2 ppb
Trace Impurities – Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities - Gold (Au)	≤ 4.0 ppb	< 0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 15 ppb	3 ppb

>>> Continued on page 2 >>>

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





Material No.: 9530-33 Batch No.: 24D1562005

Test	Specification	Result
Trace Impurities - Lead (Pb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Lithium (Li)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	2.2 ppb
Trace Impurities – Manganese (Mn)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	< 0.1 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Nickel (Ni)	\leq 4.0 ppb	0.2 ppb
Trace Impurities – Niobium (Nb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 1.0 ppb
Trace Impurities - Selenium (Se), For Information Only		< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	< 10.0 ppb
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Sodium (Na)	\leq 100.0 ppb	2.0 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	\leq 1.0 ppb	< 0.9 ppb
Trace Impurities - Thallium (TI)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities - Tin (Sn)	≤ 5.0 ppb	< 0.4 ppb
Trace Impurities – Titanium (Ti)	\leq 1.0 ppb	0.2 ppb
Trace Impurities - Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	\leq 5.0 ppb	< 0.2 ppb
Trace Impurities – Zirconium (Zr)	≤ 1.0 ppb	< 0.1 ppb

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



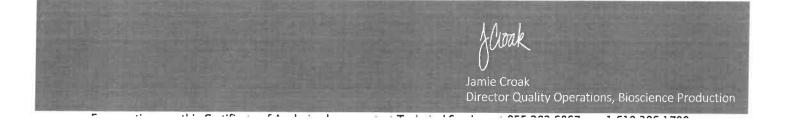


Material No.: 9530-33 Batch No.: 24D1562005

Test	Specification	Result	
	-		

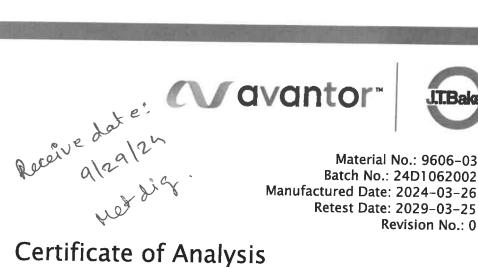
For Laboratory, Research, or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications Storage Condition: Store below 25 °C.

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



Nitric Acid 69% CMOS

M6103 M6104 M6105



Batch No.: 24D1062002 Manufactured Date: 2024-03-26 Retest Date: 2029-03-25 **Revision No.: 0**

Certificate of Analysis

Test	Specification	Result
Assay (HNO₃)	69.0 - 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	l ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO4)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO4)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities - Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	2.3 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	100 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>

For questions on this Certificate of Analysis please contact Technical Services at 855 282 6867 or +1 610 386 1700





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

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

Nitric Acid 69% CMOS



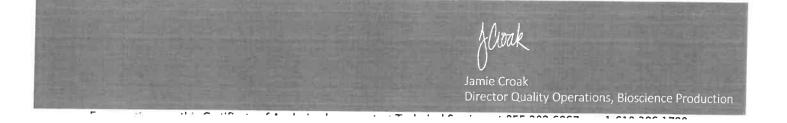


Material No.: 9606-03 Batch No.: 24D1062002

Test	Specification	Result	
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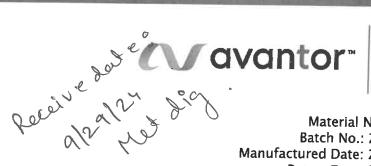
For Microelectronic Use

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



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







Material No.: 9530-33 Batch No.: 22F0762009 Manufactured Date: 2022-05-10 Retest Date: 2027-05-09 Revision No.: 0

Certificate of Analysis

Test	Specification	Result
ACS – Assay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	37.6 %
ACS – Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS - Specific Gravity at 60°/60°F	1.185 - 1.192	1.190
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS – Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS – Free Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO4)	≤ 0.05 ppm	< 0.03 ppm
Sulfate (SO4)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO3)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH4)	≤ 3 ppm	< 1 ppm
Trace Impurities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities – Aluminum (Al)	≤ 10.0 ppb	0.8 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities – Barium (Ba)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Beryllium (Be)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Bismuth (Bi)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Boron (B)	≤ 20.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities ~ Calcium (Ca)	≤ 50.0 ppb	14.9 ppb
Trace Impurities – Chromium (Cr)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities - Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities - Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities - Gold (Au)	≤ 4.0 ppb	0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 15 ppb	6 ppb

>>> Continued on page 2 >>>

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





Material No.: 9530-33 Batch No.: 22F0762009

Test	Specification	Result
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.5 ppb
Trace Impurities – Lithium (Li)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	0.8 ppb
Trace Impurities – Manganese (Mn)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	0.1 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 3.0 ppb
Trace Impurities - Nickel (Ni)	\leq 4.0 ppb	< 0.3 ppb
Trace Impurities – Niobium (Nb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 2.0 ppb
Trace Impurities – Selenium (Se), For Information Only		< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	1.0 ppb
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	0.7 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	< 0.9 ppb
Trace Impurities – Thallium (TI)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	< 0.8 ppb
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	0.2 ppb
Trace Impurities - Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	0.8 ppb
Trace Impurities – Zirconium (Zr)	≤ 1.0 ppb	< 0.1 ppb

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

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





Material No.: 9530-33 Batch No.: 22F0762009

Test	Specification	Result	

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

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

James Techier

Jamie Ethier Vice President Global Quality

Nitric Acid 69% CMOS



Receive: a/2a/21 net dig



Material No.: 9606-03 Batch No.: 24B1362001 Manufactured Date: 2024-01-25 Retest Date: 2029-01-23 **Revision No.: 0**

Certificate of Analysis

Test	Specification	Result
Assay (HNO3)	69.0 ~ 70.0 %	69.6 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO4)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO4)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24B1362001

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

Nitric Acid 69% CMOS





Material No.: 9606-03 Batch No.: 24B1362001

Test	Specification	Result	

For Microelectronic Use

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



Sr. Manager, Quality Assurance

Nitric Acid 69% CMOS



Receive: a/2a/21 net dig



Material No.: 9606-03 Batch No.: 24B1362001 Manufactured Date: 2024-01-25 Retest Date: 2029-01-23 **Revision No.: 0**

Certificate of Analysis

Test	Specification	Result
Assay (HNO3)	69.0 ~ 70.0 %	69.6 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO4)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO4)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





Material No.: 9606-03 Batch No.: 24B1362001

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

Nitric Acid 69% CMOS





Material No.: 9606-03 Batch No.: 24B1362001

Test	Specification	Result	

For Microelectronic Use

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



Sr. Manager, Quality Assurance

M612 S Receive -> 11/22/24 CORCO CHEMICAL CORPORATION

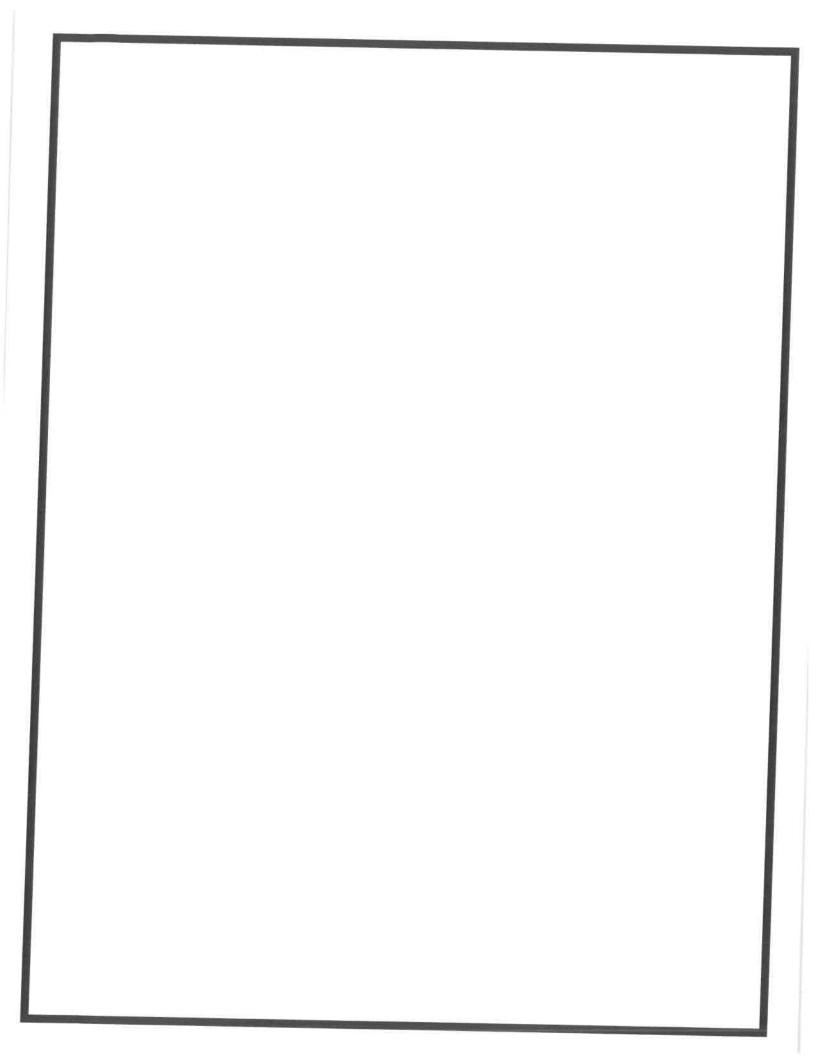
Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

Office and Plant 299 Cedar Lane Fairless Hills, PA 19030

Phone: 215-295-5006 Fax: 215-295-0781

Hydrogen Peroxide 30%, ACS Reagent Grade

SPECIFICATION	MAXIMUM LIMITS
Appearance	Colorless and free from suspended matter or sediment
Assay	29-32%
Color (APHA)	10
Residue after Evaporation	0.002%
Titratable Acid	0.0006 meq/g
Chloride (Cl)	3 ppm
Nitrate (NO ₃)	2 ppm
Phosphate	2 ppm
Sulfate (SO ₄)	5 ppm
Ammonium (NH₄)	5 ppm
Heavy Metals (as Pb)	1 ppm
Iron (Fe)	0.5 ppm







R-> 11/12/24 TH6126

Material No.: 9606-03 Batch No.: 24D1062002 Manufactured Date: 2024-03-26 Retest Date: 2029-03-25 **Revision No.: 0**

Certificate of Analysis

Test	Specification	Result
Assay (HNO₃)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	1 ppm
Chloride (CI)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO4)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO4)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	2.3 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	100 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>

Nitric Acid 69% CMOS





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

Test	Specification	Result	

For Microelectronic Use

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



_				/			1. Sodium nitrate (Na)	Compound	Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	CERTIFIED WEIGHT REPORT: Part Numbei Lot Numbei	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
m/z->	N 0 11 0	m/z-≻ 5.0E6	N.5 6	m/z-> 5.0∈6	2.5E5	5.0E5	trate (Na)	đ	Description: Sodium (Expiration Date: 12226 Recommended Storage: Ambient (2 I Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was dliuted to (mL):	<u>VEIGHT RE</u> Part I Lot I	standards.c
						[1] Spec	=		Description: Expiration Date: nended Storage: ntration (µg/mL): htration (µg/mL): T Test Number: ST Test Number:	HT REPORT: Part Number: Lot Number:	om
0		110		10		[1] Spectrum No.1	IN036 NAV01201511	Lot RM# Number	Sodiur 12226 Ambien 10000 6UTB 6UTB	<u>58111</u> 122223	
N N O		120		N. O		-				23	V
230		130		а О			10000 99.999	Nominal Purity Conc. (µg/mL) (%)	5) 3000.4 0.06		RIO
		and here and a starting				8.935 sec]:58111.D# [Count] [Linear]	999 0.10	ity Uncertainty) Purity (%)	2% 5E-05 Balance Uncertainty 0.06 Flask Uncertainty		Certi
240		140		6		.D# [Cot	26.9	Assay (%)	2% ncertainty ertainty	Solvent:	ified Refu
N U O		150		Ö		unt) [Line	111.5406	Target Weight (g)	60.0 (mL)	Lot # 24002546	erence Mi MSR 0
280		160		0 O		ar]	111.5479	Actual Weight (g)	Nitric Acid	Nitric Acid	Certified Reference Material CRM 5 124 MSR06 MS
				N			10000.7	Actual Conc. (µg/mL)		3	RM 5807
		170		70			20.0	Expanded Uncertainty +/- (µg/mL)	Formulated By:	Allea	
		180		80			7631-99-4	0	By:	aha	
		190		80			5 mg/m3	SUS information (Solvent Safety Info. On Attached pg.) AS# OSHA PEL (TWA) LD50	Aleah O'Brady	Brad	×
		200		100				SUS Information afety Info. On Atta OSHA PEL (TWA)	ady C	All I	ANAB AR-1 https:///
		ŏ		ŏ			orl-rat 3430 mg/kg	ached pg.) سەءە	122223		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com
							9/kg 3152a	NIST	223		4 Accred cate Num andards.c

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Printed: 12/29/2023 2:56:20 PM	Printed: 12/2					2 of 2							2223	Lot # 122223		# 58111	Part #
	r sed in	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. 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).	nts unless oth ity raw materi e to NIST (see the Uncertaint , D.C. (1994).	ements purity ; eable to ing the gton, D.	The certified value is the concentration calculated from gravimetric and volumetric measureme Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest puri 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 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 t Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington,	and the and the ith weig ated. atory co atory co flice,	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	avimetri ass A g are cali are cali ppropria ernmen	from gra rated Cl ior to us ces that lue, unle under a J.S. Gov	ulated er, calib er, calib er, calib er, calib g baland g baland g baland ght and ght and 1297, L	tion calc zed wat ally usin ally usin of the st and Ku al Note	ncentra ards. meticule 0.5% c 0.5% c lor, B.N Technic	The certified value is the concentration calculated from gravi Purified acids, 18.2 megohm deionized water, calibrated Clas 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., "Guidelin Measurement Result," NIST Technical Note 1297, U.S. Gover	value i s, 18.2 ion of e prepa e certifi e certifi Referen it Result	certified preparat preparat dards ar dards ar dards ar tandards suremen	* The * Purif * All s * Stan Mea:	
Certified by:	e e							standard.	on of this	reparati	ed in the j	ts observ	Physical Characterization: Homogeneity: No heterogeneity was observed in the preparation of this standard.	o heterog	Physical Characterization: Homogeneity: No heterogeneity v	Physi Homog	
	+				alyte	(T) = Target analyte	= (T)										
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			(ua/ml)	ומ	rometry (ICP-MS): Verification by ICP-M	ry (ICP		ass Spect Metals	asma Ma Trace	pled Pla	aly Cou	ductiv	sis by In	Analys	umenta	Instra	
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	*			al CRM	Certified Reference Material C	ference	tified Re	Cen					s, Inc.	ards.con	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	Absolute (800-368-1131 www.absolute	800 WWW

	1.057	2.0年7	m/z->	р. С. С. С.	5.0 E	7/2->	N 0 0	5.0E5	1. Antimony (Sb)	Compound	Volume shown below was diluted to (mL):	NIST Test Number:	Recommended Storage: Nominal Concentration (µg/mL):	Expiration Date:	Part Number: Lot Number: Description:	CERTIFIED WEIGHT REPORT:	800-368-1131 www.absolutestandards.com
)			110			10		[1] Spectrum No.1	58151	Part Number	lip sam mo	ber	nL):	ate:	on:		
			12.			NO		40.1	1 100923	Lot r Number	uted to (mL)	6UTB	Ambient (20 °C) 1000	120526	57051 120523 Antimony (Sb)		
									0.1000	Dilution Factor	: 3000.41		20 °C)		w (Sb)		Ri
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:			140			\$ 0		051.D#	0.084	Uncertainty) Pipette (mL)		Balance Uncertainty				ł	Certified
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-						Ö		_(near]	10001.4	Initial) Conc. (µg/ml				(mL)	Nitric Acid	Solvent:	nce Material
			180			80			1000.0	Final nL) Conc. (µg/mL)				Nitric Acid			CRM
			170			70			0 2.1	Expanded Uncertainty mL) +/- (µg/mL)		Reviews	K	id Formulated By:			UU UU
			180			80			7440-36-0	Ĕ	an of		20	ited By:	Ferre		
			190			0				Solvent Sa CAS# OSH/		Pertr	the second	Lawr	and b		V
						A. and A. and A. and A.			0.5 mg/m3	SDS Information nt Safety Info. On Attac OSHA PEL (TWA)		o I Rentas	SA)	Lawrence Barry	De		Alv AR https
			200			100			orl-rat 7000 mg/kg	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50							ANAB ISO 1:/034 Accreated AR-1539 Certificate Number https://Absolutestandards.com
) mg/kg 3102a) NIST	120020	120523		120523			tificate l standar

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 Spectrometry (ICP-MS):

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(T) = Target analyte

Physical Characterization:

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

Certified by:

In P. S.

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Part # 57051 Lot # 120523

 N.5 M	m/z-> 110 5.0⊑6	ហ ៣ ហ	m/z-> 10	ប ០ ព ព	[1] Spectrum No.1 1.0E7	1. Silver nitrate (Ag)	Compound	CERTIFIED WEIGHT REPORT: Part Number: Part Number: Lot Number: Lot Number: Description: Silver (A Description: Description: Silver (A Description: Optimize: Ambient (22826 Recommended Storage: Ambient (200 Nominal Concentration (µg/mL): NUST Test Number: BUTB Weight shown below was diluted to (mL):	Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com
	0 120		N		-	IN035 J0612AGA1 100	Lot Nominal RM# Number Conc. (µg/mL)	57047 122823 Silver (Ag) 122826 Ambient (20) 1000 6UTB 6UTB 6UTB	
	190 140		80 40		14.044 sec]:58147.D# [Count] [Linear]	88.8888 0.10	Nominal Purity Uncertainty Assay nc. (µg/mL) (%) Purity (%) (%)	PC) 5E-05 Balance Uncertainty	Certified I
	150		5 O		[Count] [Linear]		Target Weight (g)	Lot # 29% 80.0 (mL)	Certified Reference Material lろ ヱӋ
	160 170		60 70			1000.0	E Actual Actual Ur Weight (g) Conc. (µg/mL) +/	Nitric Acid	rial CRM M6030
	180		80			2.0 7761-88-8	Expanded Uncertainty (Solver +/- (µg/mL) CAS#		30
	190 200		90 100			10 ug/m3	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD5	Benson Chan Pedro L. Rentas	AN
	0		Ŭ			NA 3151	ched pg.) NIST LD50 SRM	122823	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

Part # 57047 Lot # 122823

1 of 2

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

							I ACE IVIE	VICLAIS	Venillaria		by ICP-I	NO (hg/mL)						
			The shares	A DECEMBER OF	Contraction in the second	Store and	12 3 2 201	10 10		2 501.2	With a light of the light	1.12	140 10 10 10 10 10 10 10 10 10 10 10 10 10	No.		No.	and the second		
A	<0.02	Q	<0.02	Dy	<0.02	Hf	<0.02	5	<0.02	N	<0.02	7	<0.02	Se	<0.2	ТЪ	<0.02	W	<0.02
SP	<0.02	Ca	<0.2	막	40.02	Но	<0.02	Lu	<0.02	Ŋ	<0.02	Re	<0.02	<u>[2</u>	<0.02	F	<0.02	d	<0.02
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Bi	<0.02	S	<0.02	ନ୍ନ	<0.02	La	<0.02	Mo	<0.02	P	<0.02	Sm	<0.02	Ś	<0.02	Sn	<0.02	2	<0.02
6	<0.02	8	40.02	Au	<0.02	РЪ	<0.02	Nd	<0.02	K	<0.2	%	<0.02	Ta	<0.02	Ð	<0.02	2	<0.02

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

(T)= Target analyte

Physical Characterization:

Certified by:

In & She

* 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.

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Absolute standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT: Part N Lot N Desc	Expiration Date: Recommended Storage:	NIST Te	Weight showr	Compound		2.0 円の	1.0巨6	TTVZ->>	1.0巨4	0 0 0	m/z->-	1.0匹6	5.0 E5	mvz->
	<u>PORT:</u> Part Number: Lot Number: Description:	Expiration Date: nended Storage:	NIST Test Number:	Weight shown below was diluted to (mL):	RM#				Ó			110			210
	<u>57081</u> 062724 Thalllum (TI)	062727 Ambient (20 °C)	6UTB	ed to (mL): Lot	Number C	INDU/ DUUF4088			N			120			220
	3	°C)		2000.1 0 Nominal Pi	Conc. (µg/mL) (88			ක 0			130			230
Certified Refi R ! 8]5]24	ğ			0.10 Flask Uncertainty Purity Uncertainty Assay	(%) Purity (%)	89,889 U.1U			4			140			240
Certified Reference Material CRM とという		2% 40 (m	sertainty	ainty v Assay Target	(%) Weight (g)	0.11			80			150			250
e Material	Lot # 24002546 Nitric Acid	40.0 Nitric Acid (mL)		get Actual		116C'7 CJR									
СRМ М6023	Acid	Acid		Actual	Weight (g) Conc. (µg/mL)	1000.1			8			160			260
23	Ala	Formulated By:	Reviewed By:	Expanded Uncertainty		2.0			70			170			
	20	\$		(Solvent	CAS#	10102-45-1			80			180			
http	Gion El o	Aleah O'Brady	Pedro L. Rentas	SDS Information Safety Info. On Atta	OSHA PEL (TWA)	u.i mg/ma			90			190			
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com		062724	062724	SDS Information (Solvent Safety Info. On Attached pg.)	s) LD50	gy/gmct sum-no			100			200			
Accredite te Numbe dards.con		4		NIST	SRM	9 3158									

Part # 57081 Lot # 062724

1 of 2

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





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

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

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(I) = Target analyte

Physical Characterization:

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

Ser P. S.

Certified by:

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

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Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com	CERTIFIED WEIGHT REPORT:	Part Number: 57023 Lot Number: 062424 Description: Vanadium (V)	Expiration Date: 062427			Volume shown below was diluted to (mL): 2000.3	Part Lot Dilution	Compound Number Number Factor	1. Ammonium metavanadate (V) 58123 021224 0.1000	[1] Spectrum No.1 [34.243 2.0E6		m/z->- 10 20	2.067	1.067	m/z 110 120 1	2.588	
8:81 Ce					5E-05	0.06	Initial		200.0	sec]:58		30			190		200
Certified Reference Material CRM 冬」 シート					Balance Uncertainty	Flask Uncertainty	Uncertainty		0.084	34.243 sec]:58023.D# [Count] [Linear]		4			140		240
eference l	Lot #	24002546	2,0%		inty		Nominal	Conc. (µg/mL)	1000	žount) [Lin		5 0			- 50		2000
Naterial Cl	Solvent:	Nitric Acid	40.0 (mL)				Initial	Conc. (µg/mL)	10000.3	1⊖ar]		60			160		260
MF M6021			Nitric Acid				Final	Con	1000.0						j.		•
21		Alla	Formulated By:	M	Reviewed By:		Expanded		2.2			70			170		
		Alleah & Brack	J By:	2 l	y:		(Solve)		7803-55-6			80			180 0		
ht		Garan	Aleah O'Brady	ento	Pedro L. Rentas		SDS Information It Safety Info. On Atta	OSHA PEL (TWA)	0.05 mg/m3			90			190		
ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com			062424	/	s 062424		SDS Information (Solvent Safety Info. On Attached pg.)	(A) LD50	3 ort-rat 58.1mg/kg			100			200		
Accreditec te Numbe dards.con	1		<u> </u>			ļ	NIST	SRM	3165								

1 of 2

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Lot # 062424

Part # 57023





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

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

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Physical Characterization:

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

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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).

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