

Fax: 908 789 8922

Prep Standard - Chemical Standard Summary

Order ID	:	P2797
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Test: Metals CLP Full

Prepbatch ID: PB161637,PB161639,

Sequence ID/Qc Batch ID: LB131408,LB131424,LB131438,

Standard ID:

MP79051, MP80924, MP80925, MP80926, MP80927, MP80928, MP80931, MP80932, MP80933, MP80934, MP80935, MP80942, MP80944, MP81026, MP81028, MP81115, MP81116, MP81119, MP81187, MP81208, MP81209, MP80944, M

Chemical ID:

M4877,M4881,M4883,M4885,M4888,M4889,M4960,M4961,M5130,M5192,M5200,M5223,M5224,M5227,M5272,M5288,M5289,M5294,M5296,M5298,M5387,M5389,M5395,M5429,M5468,M5473,M5494,M5497,M5498,M5513,M5632,M5658,M5697,M5698,M5747,M5754,M5762,M5768,M5769,M5798,M5799,M5800,M5801,M5815,M5817,M5818,M5819,M5875,M5895,M5915,M5929,M5935,M5936,W2606,



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
170	1:1HCL	MP79051	01/19/2024	07/19/2024	Al-Terek Isaac	METALS_SCA	METALS_PIPE	
						LE_2 (M SC-2)	TTE_1 (ICP A	01/19/2024

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
902	ICP AES CAL BLK (SO/ICB/CCB)	MP80924	05/30/2024	06/30/2024	Sarabjit Jaswal	None	None	
								06/11/2024

FROM 125.00000ml of M5895 + 2350.00000ml of W2606 + 25.00000ml of M5915 = Final Quantity: 2500.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1004	ICPAES ISM01.2 (S5)	MP80925	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/11/2024

FROM

 $0.25000 \text{ml of M5798} + 0.50000 \text{ml of M5429} + 0.50000 \text{ml of M5473} + 0.50000 \text{ml of M5815} + 0.50000 \text{ml of M5817} + \\ 12.50000 \text{ml of M5200} + 12.50000 \text{ml of M5288} + 12.50000 \text{ml of M5698} + 12.50000 \text{ml of M5819} + 13.75000 \text{ml of M5697} + \\ 14.50000 \text{ml of M5289} + 14.50000 \text{ml of M5298} + 14.50000 \text{ml of M5658} + 2.00000 \text{ml of M5513} + 22.50000 \text{ml of M5498} + \\ 22.50000 \text{ml of M5769} + 5.00000 \text{ml of M5272} + 5.00000 \text{ml of M5296} + 5.00000 \text{ml} \text{of M5875} + 318.50000 \text{ml of MP80924} = \text{Final Quantity: 500.000} \text{ml} \\$

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1005	ICPAES ISM01.2(S4)	MP80926	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	<u> </u>
							TTE_3 (A)	06/11/2024

FROM 50.00000ml of MP80924 + 50.00000ml of MP80925 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1007	ICPAES ISM01.2(S3)	MP80927	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/11/2024

FROM	25.00000ml of MP80925 + 75.00000ml of MP80924	= Final Quantity: 100.000 ml
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Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1008	ICPAES ISM01.2(S2)	MP80928	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/11/2024

FROM 12.50000ml of MP80925 + 87.50000ml of MP80924 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	<u>PipetteID</u>	Supervised By Mohan Bera
2054	ICV-ICPAES	MP80931	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/11/2024

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
904	ICP AES ICSA SOLN	MP80932	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	<u> </u>
							TTE_3 (A)	06/11/2024

FROM 10.00000ml of M5130 + 90.00000ml of MP80924 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
905	ICP AES ICSAB SOLN	MP80933	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	<u> </u>
							TTE_3 (A)	06/11/2024

FROM 10.00000ml of M5130 + 10.00000ml of M5223 + 80.00000ml of MP80924 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1119	ICPAES ISM01.2(CCV)	MP80934	05/30/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/11/2024

FROM 12.25000ml of M5289 + 12.50000ml of M5200 + 12.50000ml of M5298 + 7.50000ml of M5498 + 7.50000ml of M5769 + 125.00000ml of MP80925 + 322.75000ml of MP80924 = Final Quantity: 500.000 ml



FROM

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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
<u></u> 2480			05/30/2024		Sarabjit Jaswal		METALS_PIPE	Mohan Bera
							TTE_3 (A)	06/11/2024

8.00000ml of M5200 + 8.00000ml of M5289 + 8.00000ml of M5298 + 8.00000ml of M5498 + 8.00000ml of M5498 + 8.00000ml of MP80924 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
919	ICP AES INTERNAL STD	MP80942	05/30/2024	06/30/2024	Sarabjit Jaswal	None	None	
								06/11/2024

FROM 1.00000ml of M4961 + 10.00000ml of M4960 + 1969.00000ml of W2606 + 20.00000ml of M5915 = Final Quantity: 2000.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Mohan Bera
903	ICP AES RINSE SOLN	MP80944	05/30/2024	06/30/2024	Sarabjit Jaswal	None	None	
								06/11/2024

FROM 200.0000ml of M5915 + 9800.00000ml of W2606 = Final Quantity: 10000.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
921	ICPAES SPIKE SOL#6	MP81026	06/10/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	<u> </u>
							TTE_3 (A)	06/13/2024

FROM 0.12500ml of M4883 + 1.25000ml of M5192 + 25.00000ml of M5754 + 23.62500ml of MP80924 = Final Quantity: 50.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Mohan Bera
994	ICPAES ISM01.2 S1 (CONC.)	MP81028	06/10/2024	06/24/2024	Sarabjit Jaswal	None	METALS_PIPE TTE_3 (A)	06/13/2024

FROM

0.02000 ml of M5815 + 0.03000 ml of M5429 + 0.10000 ml of M4877 + 0.10000 ml of M5798 + 0.14000 ml of M5799 + 0.20000 ml of M4881 + 0.20000 ml of M4885 + 0.20000 ml of M5298 + 0.20000 ml of M5473 + 0.20000 ml of M5658 + 0.20000 ml of M5801 + 0.20000 ml of M5817 + 0.30000 ml of M5698 + 0.50000 ml of M4889 + 0.50000 ml of M5697 + 0.70000 ml of M4883 + 0.80000 ml of M5494 + 1.00000 ml of M5192 + 1.00000 ml of M5227 + 1.00000 ml of M5800 + 1.20000 ml of M5224 + 1.20000 ml of M5819 + 10.00000 ml of M5200 + 10.00000 ml of M5498 + 10.00000 ml of M5769 + 10.00000 ml of M5818 + 2.00000 ml of M4888 + 4.00000 ml of M5389 + 33.51000 ml of MP80924 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3811	SE-10PPM	MP81115	06/17/2024	06/30/2024	Sarabjit Jaswal	None	None	
								06/21/2024

FROM 0.10000ml of M4883 + 9.90000ml of MP80924 = Final Quantity: 10.000 ml



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Metals STANDARD PREPARATION LOG

Recipe <u>ID</u> 3816	NAME TL-10PPM	NO. MP81116	Prep Date 06/17/2024		Prepared By Sarabjit Jaswal	<u>ScaleID</u> None	<u>PipettelD</u> None	Supervised By Mohan Bera	
								06/21/2024	
FROM	FROM 0.10000ml of M4889 + 9.90000ml of MP80924 = Final Quantity: 10.000 ml								

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
169	1:1HNO3	MP81119	06/21/2024	10/24/2024	Al-Terek Isaac	METALS_SCA	METALS_PIPE	1
						LE_2 (M SC-2)	TTE_1 (ICP A	06/21/2024

FROM 1250.00000ml of M5935 + 1250.00000ml of W2606 = Final Quantity: 2500.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sohil Jodhani
994	ICPAES ISM01.2 S1 (CONC.)	MP81187	06/25/2024	06/30/2024	Sarabjit Jaswal	None	None	
								06/28/2024

FROM

 $0.03000 \text{ml of M5429} + 0.10000 \text{ml of M4877} + 0.10000 \text{ml of M5798} + 0.14000 \text{ml of M5799} + 0.20000 \text{ml of M4885} + \\ 0.20000 \text{ml of M5298} + 0.20000 \text{ml of M5473} + 0.20000 \text{ml of M5658} + 0.20000 \text{ml of M5747} + 0.20000 \text{ml of M5801} + \\ 0.20000 \text{ml of M5815} + 0.30000 \text{ml of M5698} + 0.40000 \text{ml of M5289} + 0.50000 \text{ml of M4889} + 0.50000 \text{ml of M4889} + 0.50000 \text{ml of M5697} + \\ 0.70000 \text{ml of M4883} + 0.70000 \text{ml of M5224} + 0.80000 \text{ml of M5494} + 1.00000 \text{ml of M5192} + 1.00000 \text{ml of M5227} + \\ 1.00000 \text{ml of M5800} + 1.20000 \text{ml of M5817} + 1.20000 \text{ml of M5819} + 10.00000 \text{ml of M5200} + 10.00000 \text{ml of M5288} + \\ 10.00000 \text{ml of M5498} + 10.00000 \text{ml of M5768} + 10.00000 \text{ml of M5818} + 2.00000 \text{ml of M4888} + 4.00000 \text{ml of M5389} + \\ 32.93000 \text{ml of MP80924} = \text{Final Quantity: 100.000} \text{ml}$

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
994	ICPAES ISM01.2 S1 (CONC.)	MP81208	06/25/2024	06/30/2024	Sarabjit Jaswal	None	METALS_PIPE	
							TTE_3 (A)	06/27/2024

FROM

 $0.02000 \text{ml of M5815} + 0.03000 \text{ml of M5429} + 0.10000 \text{ml of M4877} + 0.10000 \text{ml of M5798} + 0.14000 \text{ml of M5799} + \\ 0.20000 \text{ml of M4885} + 0.20000 \text{ml of M5192} + 0.20000 \text{ml of M5298} + 0.20000 \text{ml of M5473} + 0.20000 \text{ml of M5658} + \\ 0.20000 \text{ml of M5747} + 0.20000 \text{ml of M5801} + 0.20000 \text{ml of M5817} + 0.30000 \text{ml of M5698} + 0.40000 \text{ml of M5289} + \\ 0.50000 \text{ml of M4889} + 0.50000 \text{ml of M5697} + 0.70000 \text{ml of M4883} + 0.80000 \text{ml of M5494} + 1.00000 \text{ml of M5227} + \\ 1.00000 \text{ml of M5800} + 1.20000 \text{ml of M5224} + 1.20000 \text{ml of M5819} + 10.00000 \text{ml of M5200} + 10.00000 \text{ml of M5288} + \\ 10.00000 \text{ml of M5468} + 10.00000 \text{ml of M5497} + 10.00000 \text{ml of M5818} + 2.00000 \text{ml of M4888} + 4.00000 \text{ml of M5387} + \\ 34.41000 \text{ml of MP80924} = \text{Final Quantity: } 100.000 \text{ ml}$



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Metals STANDARD PREPARATION LOG

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



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57048 / Cd, 1000 PPM, 125 ml	072821	07/28/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4877
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57082 / Pb, 1000 PPM, 125 ml	062221	06/22/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4881
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	070221	07/02/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4883
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	072921	07/29/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4885
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57022 / Ti, 1000 PPM, 125 ml	070721	07/07/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4888
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	073021	07/30/2024	08/06/2021 / jaswal	08/05/2021 / jaswal	M4889



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGIN10-5 / INDIUM 1 x 500 ml	100721	10/07/2024	10/09/2021 / jaswal	10/08/2021 / jaswal	M4960
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58139 / Y, 10000 PPM, 500 ml	052521	06/25/2024	10/09/2021 / jaswal	01/25/2019 / jaswal	M4961
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART A / ICSA (ICP) STOCK SOLN	ICSA-1211	11/19/2024	05/20/2024 / bin	04/20/2021 / bin	M5130
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 /	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	092121	09/21/2024	06/23/2022 / bin	10/05/2021 / bin	M5200
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date /	Chemtech Lot #
EPA	PART B / ICSAB (ICP) STOCK SOLN	ICSB-0710	11/19/2024	05/20/2024 / bin	04/20/2021 / bin	M5223



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	101521	10/15/2024	06/29/2022 / bin	10/18/2021 / bin	M5224
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	100121	10/01/2024	07/01/2022 / bin	10/18/2021 / bin	M5227
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	/ Antimony (Sb)	051822	05/18/2025	05/10/2023 / bin	08/24/2022 / jaswal	M5272
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 #
Absolute Standards, Inc.	58113 / Aluminum (Al) 10,000PPM	070622	07/06/2025	09/02/2022 / jaswal	07/12/2022 / jaswal	M5289
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	01/01/2025	12/13/2023 / bin	02/20/2020 / bin	M5294



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	S2-MEB711673	11/02/2026	09/19/2022 / jaswal	08/20/2022 / jaswal	M5296
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	020422	02/04/2025	05/02/2023 / jaswal	06/15/2022 / jaswal	M5298
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	11/01/2022 / jaswal	09/18/2022 / jaswal	M5387
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	04/29/2024 / kareem	09/18/2022 / bin	M5389
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB714159	01/13/2027	01/30/2024 / bin	09/19/2022 / bin	M5395
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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.	58112 / Mg, 10000 PPM, 500 ml	120922	12/09/2025	03/14/2023 / jaswal	03/14/2023 / jaswal	M5468
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57138 / Sr, 10000 PPM, 125 ml	082922	08/29/2025	03/16/2023 / jaswal	03/16/2023 / jaswal	M5473
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57028 / Ni, 1000 PPM, 125 ml	011223	01/12/2026	01/20/2023 / bin	01/19/2023 / bin	M5494
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	031523	03/15/2026	03/18/2023 / bin	03/17/2023 / bin	M5497
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date /	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 /	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57182 / Pb, 10000 PPM, 125 ml	061522	06/15/2025	03/19/2023 / bin	03/17/2023 / bin	M5513



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	1403 / Hydrogen Peroxide, 30% 1 gal	820803	08/31/2024	01/03/2024 / bin	08/03/2022 / Al-Terek	M5632
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	102523	10/25/2026	04/03/2024 / jaswal	10/27/2023 / jaswal	M5697
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 /	Received Date /	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 /	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	52166 / ICP-AES Spike sample water matrix (18 comp.)	112823	11/28/2026	05/01/2024 / jaswal	12/15/2023 / jaswal	M5754



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	0000281827	03/29/2026	12/29/2023 / bin	12/01/2023 / Al-Terek	M5762
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	01/08/2024 / bin	01/03/2024 / bin	M5768
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 /	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 /	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 /	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	02/09/2024 / bin	02/09/2024 / bin	M5800



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 / jaswal	02/09/2024 / jaswal	M5818
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date /	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 /	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL	T2-MEB714417	01/27/2027	04/19/2024 / jaswal	02/22/2024 / jaswal	M5875



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	240415	11/06/2024	06/04/2024 / Al-Terek	05/07/2024 / Al-Terek	M5895
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	11/29/2024	05/30/2024 / Al-Terek	05/24/2024 / Al-Terek	M5915
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22G2862015	12/08/2024	06/24/2024 / Al-Terek	06/07/2024 / Al-Terek	M5929
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	12/08/2024	06/21/2024 / Al-Terek	06/07/2024 / Al-Terek	M5935
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date /	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	12/20/2024	06/24/2024 / Al-Terek	06/18/2024 / Al-Terek	M5936
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	10/24/2024	10/24/2019 / apatel	10/24/2019 / apatel	W2606



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, Molybdenum,

Silicon, Tin,

Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Boron, B $1\ 000\pm 6\ \mu g/mL$ Molybdenum, Mo $1\ 000\pm 6\ \mu g/mL$ Silicon, Si $1\ 000\pm 7\ \mu g/mL$ Tin, Sn $1\ 000\pm 6\ \mu g/mL$

Titanium, Ti $1000 \pm 7 \mu g/mL$

Density: 1.030 g/mL (measured at 20 \pm 4 °C)

Assay Information:

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
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 Characterization of CRM/RM by One Method Certified Value, X_{CRM/RM}, where two or more methods of characterization are 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} Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u_{char a} = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM}$ = k ($u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$)^{1/2} CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)\right]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u_{char a} = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty u_{lts} = long term stability standard uncertainty (storage) u_{lts} = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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 $20^{\circ} \pm 4^{\circ}$ 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; inorganic ventures.com; info@inorganic ventures.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

- Sealed TCT Rag Open Date:

- 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

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This CDM/DM should not be up	and langer than one year for six	months in the case of a 2	n ml

- I his 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.

Michael 2 Booth

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth Director, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

Paul R Laine



Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CLPP-CAL-1

Lot Number: T2-MEB714417

Matrix: 5% (v/v) HNO3

Value / Analyte(s): 5 000 µg/mL ea:

Calcium, Potassium, Magnesium, Sodium,

2 000 µg/mL ea:

Aluminum, Barium,

1 000 µg/mL ea:

Iron,

500 μg/mL ea:

Nickel, Vanadium, Zinc, Cobalt,

Manganese, 250 μg/mL ea:

Silver, Copper,

200 μg/mL ea: Chromium, 50 μg/mL ea: Beryllium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

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	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151	160729
	Ag	Volhard	999c	999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	Ва	ICP Assay	3104a	140909
	Ва	Gravimetric		See Sec. 4.2
	Ве	ICP Assay	3105a	090514
	Ве	Calculated		See Sec. 4.2
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cr	Calculated		See Sec. 4.2
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	K	ICP Assay	3141a	140813
	K	Gravimetric		See Sec. 4.2
	Mg	ICP Assay	3131a	140110
	Mg	EDTA	928	928
	Mn	ICP Assay	3132	050429
	Mn	EDTA	928	928
	Na	ICP Assay	3152a	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 Characterization of CRM/RM by One Method Certified Value, X_{CRM/RM}, where two or more methods of characterization are 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} Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u_{char a} = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = [\Sigma((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u_{char a} = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty ults = long term stability standard uncertainty (storage) u_{lts} = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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 $20^{\circ} \pm 4^{\circ}$ C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

Note: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information.

https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 27, 2022

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

11.2 Lot Expiration Date

- January 27, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

20178Ci



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 ACCREDITATION / REGISTRATION

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2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

CLPP-CAL-3 Catalog Number: T2-MEB714159 Lot Number: Matrix: 7% (v/v) HNO3 Value / Analyte(s):

> Arsenic, Lead, Selenium, Thallium,

500 µg/mL ea: Cadmium

1 000 µg/mL ea:

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE 1 000 ± 8 µg/mL Cadmium, Cd $500.0 \pm 2.1 \,\mu g/mL$ Arsenic, As Lead, Pb 1 000 ± 5 µg/mL Selenium, Se 1 000 ± 8 µg/mL

Thallium, TI 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
TI	ICP Assay	3158	151215

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

Characterization of CRM/RM by Two or More Methods Characterization of CRM/RM by One Method Certified Value, X_{CRM/RM}, where two or more methods of characterization are 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} Xa = mean of Assay Method A with $\mathbf{w_i}$ = the weighting factors for each method calculated using the inverse square of u_{char a} = the standard uncertainty of characterization Method A $\mathbf{w_i} = (1/u_{\text{char i}})^2 / (\Sigma (1/(u_{\text{char i}})^2)$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{char}^2 a + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$ k = coverage factor = 2 k = coverage factor = 2 $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}}_i)^2)\right]^{1/2}$ where $\mathbf{u_{char}}_i$ are the errors from each characterization method u_{char a} = the errors from characterization ubb = bottle to bottle homogeneity standard uncertainty $\mathbf{u_{bb}}$ = bottle to bottle homogeneity standard uncertainty ults = long term stability standard uncertainty (storage) u_{lts} = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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 $20^{\circ} \pm 4^{\circ}$ C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganic ventures.com; info@inorganic ventures.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:	
· Sealeo TCT Bao Oberi Dale	

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

20178Ci

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com

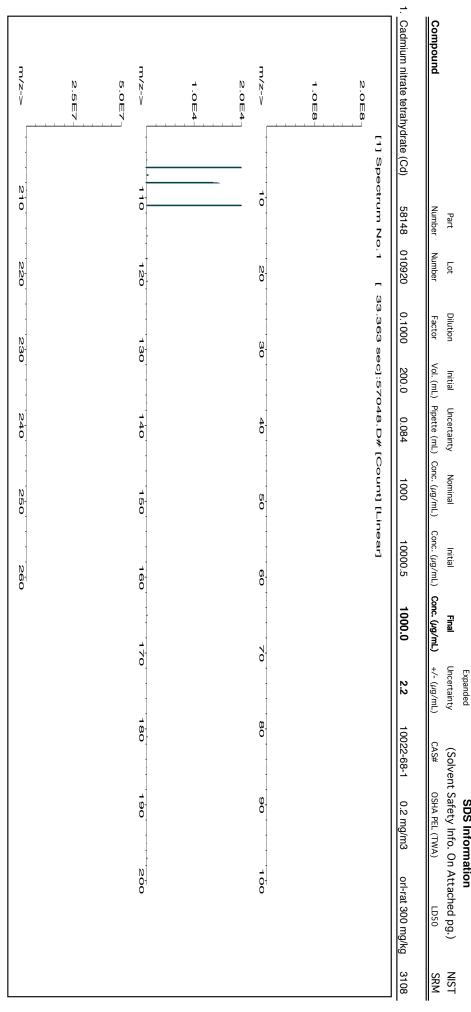


Certified Reference Material CRM



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

Volume shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
iluted to (mL): 2	6UTB	1000	Ambient (20 °C)	072824		Cadmium (Cd)	072821	57048	
2000.02			•			۳			
0.058 Flask Uncertainty	5E-05 Balance Uncertainty				2.0%			2037001	Lot#
					%			_	
				(mL)	40.0			Nitric Acid	Solvent:
					Nitric Acid				
	Reviewed By:	Juna	1)	Formulated By:	6	Tierany	. Y 0	
	Pedro L. Rentas	Jeens	K		Giovanni Esposito		ってもろうで		
	072821				072821				



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

						Trace M	etals	Verifica	tion	oy ICP-N	IS (µc	J/mL)						
<0.02	СА	Т	Dy	<0.02	Hf	<0.02	Li	< 0.02	Z:	<0.02	P_{Γ}	<0.02	Se	<0.2	Тъ	< 0.02	W	< 0.02
<0.02	Ca	<0.2	먁	< 0.02	Но	<0.02	Lu	< 0.02	Ŗ	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
<0.2	Се	< 0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02]]	<0.02	<	<0.02
<0.02	Cs	< 0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	ΥЬ	<0.02
<0.01	Cr	< 0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
<0.02	င္ပ	< 0.02	Ge	<0.02	La	<0.02	Мо	< 0.02	Pŧ	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
< 0.02	Cu	< 0.02	Au	<0.02	Рь	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02
	40.02 40.02 40.02 40.02 40.02 40.01 40.02 40.02 40.02	40.02 Cd 40.02 Ca 40.02 Ce 40.02 Cs 40.01 Cr 40.02 Co		5 6 5 5 5 5	Cd T Ca <0.2 Ce <0.02 Cs <0.02 Cr <0.02 Co <0.02 Co <0.02	Cd T Dy <0.02 Ca <0.2 Er <0.02 Ce <0.02 Eu <0.02 Cs <0.02 Ga <0.02 Cr <0.02 Ga <0.02 Co <0.02 Ga <0.02 Co <0.02 Ga <0.02 Co <0.02 Au <0.02	Cd T Dy <0.02 Ca <0.2	Cd T Dy <0.02 Hf Ca <0.02 Er <0.02 In Co <0.02 In Co <0.02 Ga <0.02 Fe <0.02 Fe <0.02 In Co <0.02 Ga <0.02 Fe <0.02 Ga <0.02 Fe <0.02 Ga <0.02 Fe <0.02 Ga <0.02 Pb	Trace Me Cd T Dy <0.02 Hf <0.02 Ca <0.2	Trace Metals Verification Cd T Dy <0.02 Hf <0.02 Li <0.02 Ca <0.02	Trace Metals Verificati Cd T Dy <0.02 Hf <0.02 Li <0.02 Ca <0.02	Trace Metals Verification by ICP-MS Cd T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Ca <0.02	Trace Metals Verification by ICP-MS (µg/m Cd T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Pr <d th=""> Ca <0.02</d>	Trace Metals Verification by ICP-MS (μg/mL) Cd T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Pr <0.02 Ca <0.02	Trace Metals Verification by ICP-MS (µg/mL) Cd T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Pr <0.02 Ca <0.02	Cd T Dy O.02 Hf O.02 Li O.02 Ni O.02 Pr O.02 Pr O.02 Si O.2 Co O.02 Hi O.02 Li O.02 Ni O.02 Pr O.02 Si O.2 Si O.02 Si	Cci T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Pr <0.02 Se <0.02 Ca <0.02	Cci T Dy <0.02 Hf <0.02 Li <0.02 Ni <0.02 Pr <0.02 To <0.02

(T)= Target analyte

Physical Characterization:

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

Certified by:

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

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

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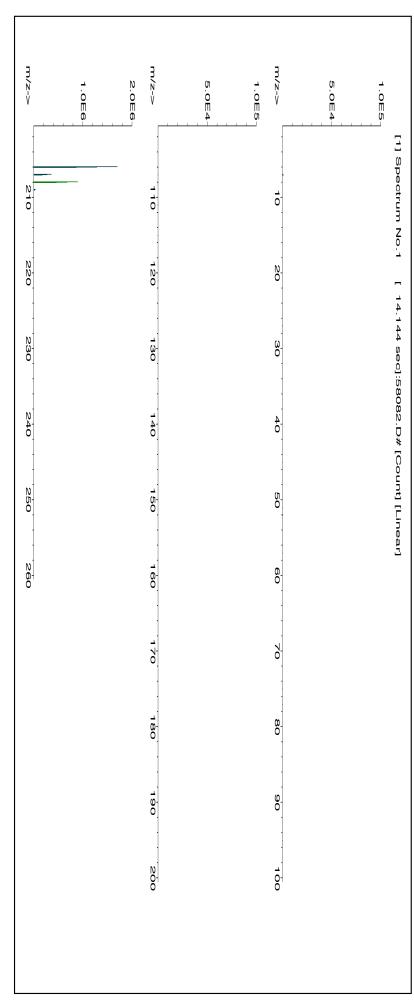


CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: **Lot Number:** Description: 57082 062221 Lead (Pb) 1000 062224 Ambient (20 °C) 2000.02 5E-05 0.058 Flask Uncertainty Balance Uncertainty 20370011 Lot # 2.0% Nitric Acid Solvent: (mL)40.0 Nitric Acid Formulated By: Reviewed By: Pedro L. Rentas Lawrence Barry 062221 062221

	Part	Part Lot	Dilution		Initial Uncertainty Nominal	Nominal	Initial	Final	Final Uncertainty	(Solve	(Solvent Safety Info. On Attached pg.)	Attached pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Number Number Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Cor	Conc. (µg/mL)	nc. (μg/mL) +/- (μg/mL)		CAS# OSHA PEL (TWA)	LD50	SRM
1. Lead (II) Nitrate (Pb)	58182	032321	0.1000	200.0	0.084	58182 032321 0.1000 200.0 0.084 1000	10000.1	1000.0	2.2	10099-74-8	0.05 mg/m3	2.2 10099-74-8 0.05 mg/m3 intrvns-rat 93 mg/kg 3128	g 3128

Expanded

SDS Information



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

							Trace M	etals	Verifica:	tion k	ງy ICP-№	IS (µç)/mL)						
Al	< 0.02	СЧ	<0.02	Dy	<0.02	Hf	< 0.02	Li	<0.02	N:	< 0.02	Pr	<0.02	Se	<0.2	Тъ	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Но	< 0.02	Lu	<0.02	Nb	< 0.02	Re	<0.02	Si	< 0.02	Te	<0.02	U	<0.02
As	<0.2	Се	<0.02	Eu	<0.02	h	< 0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	< 0.02	T	<0.02	٧	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	ŀ	< 0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	ΥЪ	<0.02
Ве	<0.01	Ç	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	< 0.02	Tm	<0.02	Υ	<0.02
B:	<0.02	Со	<0.02	Ge	<0.02	La	< 0.02	Мо	<0.02	Ρt	<0.02	Sm	<0.02	s	< 0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Pb	T	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	< 0.02	Ti	<0.02	Zr	<0.02
									(T)- T	(T)- Tamet analyte	alvto								

(I)= larget analyte

Physical Characterization:

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

Certified by:

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

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

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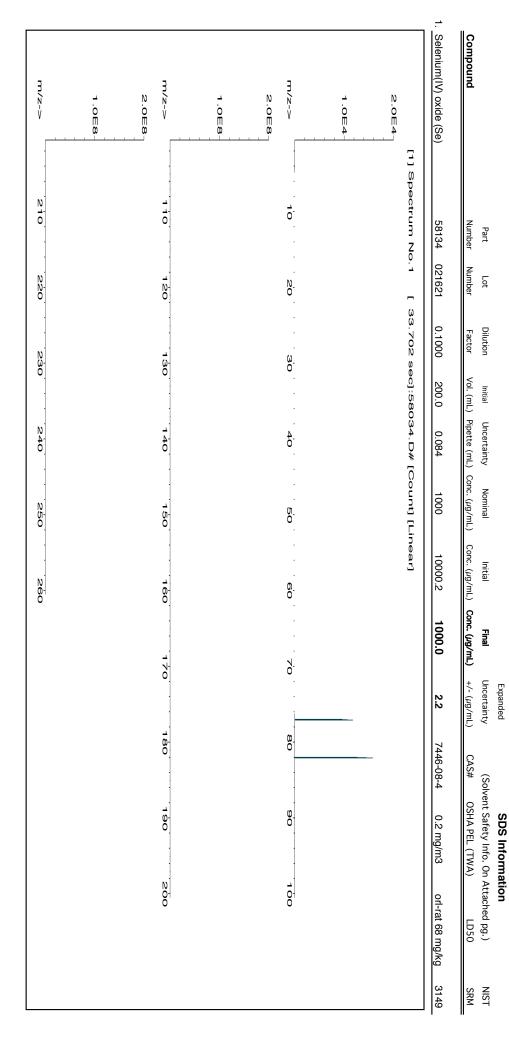


Certified Reference Material CRM



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

Volume shown below was diluted to (mL): 2000.02	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
iluted to (mL): 20	6ИТВ	1000	Ambient (20 °C)	070224		Selenium (Se)	070221	<u>57034</u>	
0.058 F	5E-05 E								
0.058 Flask Uncertainty	Balance Uncertainty				2.0%			20370011	Lot #
				(mL)	40.0			11 Nitric Acid	Solvent:
					Nitric Acid				-
	Reviewed By:	Tuesto	1	7	Formulated By:	ě	力でなった	. Y .	
	Pedro L. Rentas	Juna	A A	7	Giovanni Esposito		マトラマララ	+	
	070221				070221				



Part # 57034

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Certified Reference Material CRM



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

3	<0.02 Co	Be <0.01 Cr <0.02	<0.02 Cs	<0.2 Ce	Ca	<0.02 Cd		
Au	Ge	Ga	Gd	Eu	Εŗ	Dy		
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Рь	La	Fe	ŀ	In	Но	Hf		
< 0.02	<0.02	<0.2	<0.02	<0.02	<0.02	< 0.02	I race M	
Nd	Мо	Hg	Mn	Mg	Lu	Li	etals	
<0.02	<0.02	<0.2	<0.02	< 0.01	<0.02	< 0.02	Verifica:	
K	Ρŧ	P	Pd	Os	N _p	N:	tion k	
<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	< 0.02	y ICP-M	
Sc	Sm	Ru	Rb	Rh	Re	Pr	15 (<i>µ</i> ç	,
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	< 0.02	/mL)	, , ,
Ta	S	Sr	Na	Ag	Si	Se		
<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	T		
Ti	Sn	Tm	Th	T1	Te	Тъ		
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	< 0.02		
Zr	Zn	×	ďΥ	<	U	W		
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		

(T)= Target analyte

Physical Characterization:

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

Certified by:



- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: **Lot Number:** Description: 57047 072921 Silver (Ag) 072924 1000 Ambient (20 °C) 2000.02 0.058 5E-05 Balance Uncertainty Flask Uncertainty 20370011 Lot # 2.0% Nitric Acid Solvent: (mL)40.0 Nitric Acid Formulated By: Reviewed By: Giovannie Laperthe, Pedro L. Rentas Giovanni Esposito ento 072921 072921

Part Number

Lot Number

Vol. (mL)

Uncertainty
Pipette (mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Expanded
Uncertainty
+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM SRM

(Solvent Safety Info. On Attached pg.)

SDS Information

Nominal

Initial

Final

Dilution Factor

Initial

m/z->	N.5E6-	5.0E6	m/z->	2.555	5.0E5	m/z->	 1000-	2000	
N10			110			10			[1] Spectrum No.1
N N O			120			N ₀			
NG0 0			130			30			0.014 sec]:
ν 040			140			4.			[10.014 sec]:58047.D# [Count] [Linear]
N (50)			150			50			Count] [Line
N 00			160			60			ear]
			170			70			
			180			80			
			190			90			
			200			100			

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

							Trace M	etals	Verifica	tion	oy ICP-N	IS (µo	J/mL)						
		2		,		110				X 7:		,		ñ		3	8	777	
Al	<0.02	С	< 0.02	Dy	<0.02	Нf	< 0.02	Li	< 0.02	N:	<0.02	Pr	< 0.02	Se	<0.2	ďТ	<0.02	M	< 0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Но	<0.02	Lu	<0.02	Np	<0.02	Re	<0.02	S:	<0.02	Te	<0.02	U	< 0.02
As	<0.2	Се	< 0.02	Eu	<0.02	In	<0.02	Mg	< 0.01	Os	<0.02	Rh	<0.02	Ag	Т	11	<0.02	٧	< 0.02
Ba	<0.02	Cs	< 0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	ΥЬ	< 0.02
Ве	< 0.01	Ωr	< 0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Υ	< 0.02
Bi	<0.02	Со	< 0.02	Ge	<0.02	La	<0.02	Мо	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	< 0.02
В	< 0.02	Cu	< 0.02	Au	<0.02	Рь	< 0.02	Nd	<0.02	K	<0.2	Sc	< 0.02	Ta	< 0.02	Ti	<0.02	Zr	< 0.02

(T)= Target analyte

Physical Characterization:

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

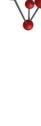
Certified by:

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



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

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: **Lot Number:** Description: 070724 1000 57022 070721 Ambient (20 °C) Titanium (Ti) 2000.02 0.058 5E-05 Flask Uncertainty Balance Uncertainty 20370011 Lot # 2.0% Nitric Acid Solvent: (mL) 40.0 Nitric Acid Formulated By: Reviewed By: Expanded Pedro L. Rentas ento Lawrence Barry SDS Information 070721 070721

1. Ammonium hexafluorotitanate (Ti)

58122

070120

0.1000

200.0

0.084

1000

10000.1

1000.0

2.2

16962-40-6

2.5 (F) mg/m3

Κ

3162a

Compound

Number

Number Lot

Vol. (mL)

Pipette

Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL) Uncertainty

CAS#

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

LD50

NIST SRM

Final

Part

Dilution Factor

Initial

Uncertainty

Nominal

m/x>	2.507	5.0E7	1.0E8-	2.0E8	5.0E4-	1.0E5
מ		110		10		
N N O		120		20		
230		130		30		
040		140		40		
250		150		50		
ν 60		160		60		
		170 1		70		
		180 19		9		
		190 200		90 100		

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

							Trace M	letals	Verifica:	tion	oy ICP-N	ir) SV	₃/mL)						
Al	< 0.02	Cd	< 0.02	Dy	<0.02	Ή	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	ф	<0.02	W	< 0.02
Sb	<0.02	Ca	<0.2	땹	<0.02	Но	<0.02	Lu	<0.02	В	<0.02	Re	<0.02	S:	<0.02	Te	<0.02	U	<0.02
As	40.2	Се	<0.02	Eu	<0.02	Ín	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	TI	<0.02	<	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Υь	<0.02
Ве	<0.01	Cr	< 0.02	Ga	<0.02	Fe	<0.2	$_{ m Hg}$	<0.2	P	< 0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Со	<0.02	Ge	<0.02	La	<0.02	Мо	<0.02	Ρt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Рь	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	Τ	Zr	< 0.02
) I										

(T)= Target analyte

Physical Characterization:

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

Certified by:

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

 * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in
- the preparation of all standards.* All standard containers are meticulously cleaned prior to use.
- * All standard containers are meticulously cleaned prior to use.

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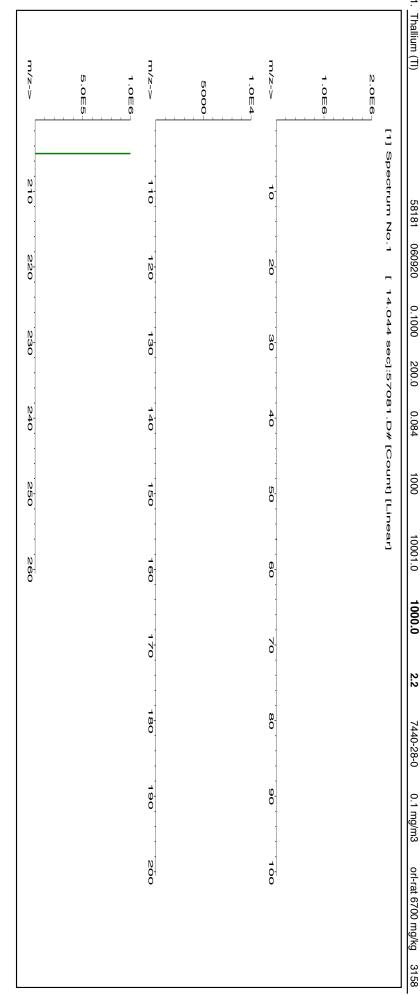


Certified Reference Material CRM



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

1. Thallium (TI)	Compound	Volume	NIS	Recommended Storage: Nominal Concentration (µg/mL):	F					CERTIFIED WEIGHT REPORT:	
51	Z	Volume shown below was diluted to (mL):	NIST Test Number:	Recommended Storage: I Concentration (µg/mL):	Expiration Date:		Description:	Lot Number:	Part Number:	<u>ORT:</u>	
58181 060920	Part Number	diluted	: . 6	≟ ≥	0		ı	9 19	וֹנ		(
060920	Lot Number	to (mL):	6UTB	Ambient (20 °C) 1000	073024		Гhallium (TI	073021	7081		
0 1000	Dilution Factor	2000.02		°C)			E				
	Initial Vol. (mL)	0.058									
0 00 4	Initial Uncertainty ol. (mL) Pipette (mL)	Flask Uncertainty	Balance Uncertainty								
1000	Nominal Conc. (µg/mL)	ıtγ	tainty			2.0%		0	20370011	Lot#	
10001.0	Initial Conc. (µg/mL)				(mL)	40.0			Nitric Acid	Solvent:	
1000.0	Initial Uncertainty Nominal Initial Final Uncertainty Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL)					Nitric Acid					
2.2	Uncertainty +/- (µg/mL)	Expanded	Reviewed By:	M	\	Formulated By:	2	1°			
7440-28-0	(Solv			16 V	7	y:	1	Jack S			•
0.1 mg/m3	(Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	SDS Information	Pedro L. Rentas	tenta		Giovanni Esposito	-	Taracter.	•		1
orl-rat 6700 mg/kg	Attached pg.) LD50	tion	073021			073021					
3158	NIST SRM		ت	•			1		!		



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

							Trace M	letals	Verificatio	tion	by ICP-N	id) SV	g/mL)					
Al	< 0.02	СА	< 0.02	Dy	< 0.02	Нf	<0.02	Ŀ	<0.02	Z:	<0.02	Pr	<0.02	Se	<0.2	Ть		<0.02
Sb	< 0.02	Ca	<0.2	Ę	< 0.02	Но	< 0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	S:	<0.02	Te	<u>^</u>).02
As	<0.2	Се	< 0.02	Eu	< 0.02	In	< 0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	<u>T</u> 1	. 1	Г
Ва	< 0.02	Cs	< 0.02	Gd	< 0.02	ŀ	< 0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.0	ß
Ве	< 0.01	Cr	< 0.02	Ga	< 0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	< 0.02	Ö
Bi	< 0.02	င္ပ	< 0.02	Ge	< 0.02	La	< 0.02	Мо	<0.02	P	<0.02	Sm	<0.02	S	<0.02	Sn	<0.0	ß
В	<0.02	Cu	<0.02	Au	< 0.02	Рь	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.	02
									(T) - Target applicate	2501.40								

(I)= larget analyte

Physical Characterization:

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

Certified by:



- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: Description:

58149

100721

Indium (In)

R: 10/08,

Lot #

Solvent: 20370011 Nitric Acid

Gierannie

respective

5%

Nitric Acid

(III) 25.0

> Formulated By: Giovanni Esposito

> > 100721

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

10000

Recommended Storage:

Expiration Date:

100724 Ambient (20 °C)

Weight shown below was diluted to (mL):

500.06

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

Lot

Nominal

Purity Uncertainty Assay

Target

Actual

Actual

Uncertainty Expanded

Reviewed By:

Pedro L. Rentas

100721

SDS Information

NIST

 Indium Oxide (In) IN086 W1096A RM# Number Conc. (µg/mL) 10000 99.999 8 Purity (%) 0.10 82.6 8 Weight (g) 6.05408 Weight (g) Conc. (µg/mL) 6.05441 10000.6 +/- (µg/mL) 20.1 1312-43-2 CAS# (Solvent Safety Info. On Attached pg.)

OSHA PEL (TWA) LD50 X Z 3124a SRM

m/z->	2.5E6	5.0E6	m/z->	1.0E6	2.0E6	m/z->	2.5E7	5.0E7
210			110		Ma	10		
N N N O			120			200		
230			130			30		
240			140			40		
250			150			50		
260			160			60		
			170			70		
			180			80		
			190			90		
			200			100		



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

	-		-				
₩	Bi	Ba	As	Sb	A		
40.02	♦ 0.01	40.02	0.2	<0.02	<0.02		
Cr.	ರಿ ರ	S	င့	Ca	ß		
<0.02	<0.02	<0.02	<0.02	40.2	<0.02		
<u>≱</u>	ද ව	8	Eu	甲	Dy		
<0.02	<0.02 0.02	<0.02	<0.02	<0.02	<0.02		
P	L F	F	In	Но	Hf		
<0.02	40,02	<0.02	7	<0.02	<0.02	I acc ivid	Trace Ma
Z S	M _o	M	Mg	Lu	<u>L</u> .	icrais	2+2/2
40.02 K	402	<0.02	40.01	<0.02	<0.02	ACHICA	Vorificat
R :	Ā Þ	Pd	õ	S	Z		2
	<0.02	<0.02	<0.02	<0.02	<0.02	y ICF-IVIO	WICD MC
Sc S	S P	R _b	Rh.	Re	꾸	649	
40.02	A 0.02	<0.02	<0.02	<0.02	<0.02		1
ia o	Sr.	N _a	Ag	Si	Se		
40.02	A 0.02	0.2	<0.02	40.02	40.2		
=1 }	S T	ħ	Ħ	Te	Тb		
40.02	A A.02	<0.02	<0.02	<0.02	40.02		
7.7	7 4	4,4	<	c	W		
<0.02	40.02	<0.02	<0.02	<0.02	<0.02		

(I)= larger analyte

Physical Characterization:

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

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

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

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Certified Reference Material CRM 180/08



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

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: 58139 Solvent: 20370011 Lot # Nitric Acid Remone

2%

Nitric Acid

Formulated By:

Lawrence Barry

052521

<u>a</u> 40.0

Reviewed By:

Pedro L. Rentas

052521

Description: 052521 Yttrium (Y)

Recommended Storage: **Expiration Date:** Ambient (20 °C) 052524

Nominal Concentration (µg/mL): NIST Test Number: **6UTB** 10000 5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02 0.058 Flask Uncertainty

Yttrium (III) Oxide (Y)

IN087 YV012015B1

10000

99.999

0.10

77.9

25.6744

25.6745 10000.0

20.0

1314-36-9

¥

									Expanded		SDS Information	
	Гot	Nominal	Purity	Purity Uncertainty Assay	Assay	Target	Actual	Actual	Uncertainty	_	(Solvent Safety Info. On Attached pg.)	NIST
Compound RM#	Number	Conc. (µg/mL)	(%)	Purity (%)	(%)	Weight (g)	Weight (g) C	Conc. (µg/mL)	Conc. (µg/mL) +/- (µg/mL) CAS#	CAS#	OSHA PEL (TWA) LD50	SRM

m/z->	1.0E5	2.0E5	m/z->	2.5E4	5.0€4	m/z->	1.0E6	2.056
210			110			0		
N						N		
220			120			20		,
230			130			30		
240			140			6		
250			150			50		
o _.								
260			160			0		
			170			70		
			C					
			180			80		
			<u>,</u>			90		
			190			0		
			200			100		

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

	DE TOWN	40.02 Cil 40.03	<0007 Co	Be <0.01 C. A.D. G.	<0.02 Cs <0.02 Cd	<0.2 Ce <0.07 Fil	<0.02 Ca <0.2 Er	<0.02 Cd <0.02 Dy		
	L	-		0.02						
	20.02	40.02	8	\$0.02	A0.02	A0.02	3	<0.02	Trace Me	
	Nd	Mo	gH.	ĭ Nn	Z 29		1 5	7.:	Metals	
(T)= Target	<0.02	<0.02	40.2	<0.02	<0.01	<0.02	10.01	A) 03	Verifica	
Target analyte	K	Pt	φ	Pd	o _s	S	2	N.	tion On	
J	40.2	<0.02	<0.02	<0.02	<0.02	<0.02	20.02	2000	by ICP-	
	Sc	Sm	Ru	Rb	R	Re	77	7	NS C	
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	20.02	500	ua/mL)	
	Ta	s	Sr	Na	Ag	Si	Se	2		
	<0.02	<0.02	<0.02	40.2	<0.02	<0.02	202			
	Ti	Sn	Tm	T)	11	Te	10			
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	40.02			
The state of the s	Zr	Zn	×	ЧY	<	d	8			
The state of the s	<0.02	0.02	-1	<0.02	<0.02	<0.02	<0.02			

Physical Characterization:

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

Certified by:

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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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







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

Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

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

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

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

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

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

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211,
AND ICSA-1211 MIXED WITH ICSB-0710

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

ICSA M5126 M5127 M5128 M5129 M5130

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value \pm 1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value \pm 15 percent of the listed certified value.

value \pm 15 percent of the listed certified value.

ICSB

M5219

M5220

M5221

M5222

M5223

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M.5192 R: 06/17/2

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CERTIFIED WEIGHT REPORT: Ammonium molybdate (Mo) Compound Nominal Concentration (µg/mL): m/z-> M/z-> Recommended Storage: m/z-> Volume shown below was diluted to (mL): 2.0E6 1.0E6 1.0E5 2.0E5 2000 1000 **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 58142 Number Part **BTU9** 1000 57042 Ambient (20 °C) 051722 051725 Molybdenum (Mo) 022222 Fot 120 220 20 [8.594 sec]:57042.D# [Count] [Linear] 3000.41 0.1000 Factor Dilution 130 230 30 5E-05 300.0 Vol. (mL) 0.058 Initial Flask Uncertainty Balance Uncertainty Pipette (mL) Conc. (µg/mL) Uncertainty 0.084 240 140 40 MKBQ8597V Ammonium hydroxide Nominal Lot # 0.5% 1000 250 150 50 Conc. (µg/mL) 10001.0 Initial (III) 15.0 160 260 60 Conc. (µg/mL) Ammonium hydroxide 1000.0 Final 170 70 Formulated By: Reviewed By: Uncertainty +/- (µg/mL) Expanded 2.1 180 80 13106-76-8 (Solvent Safety Info. On Attached pg.) Lawrence Barry OSHA PEL (TWA) Pedro L. Rentas 5 mg(Mo)/m3 190 90 SDS Information 200 100 orl-rat 333 mg/kg 051722 051722 3134 SRM TSIN

Printed: 6/16/2022, 1:36:08 PM

Certified Reference Material CRM



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

		u	-	D.	Ве	Ва		D 6	Sb	A	-		
		-	-		10.0					-			
		.02	70.	3 :	0	22	1	5	8	.02	The second second		
		5	8	,	-	င္ပ	6	,	<u>د</u>	8	THE PERSON NAMED IN		
		40.02	20.02	0 00	3	40.02	20.02	3	402	40.02			
		Au	Ç	2	3 -	වු	ᄪ	į	Ţ.	Dy			
		0.02	<0.02	20.02	3	<0.02	<0.02	20.02	3	<0.02			
		3	7	7	71 1	='	Б	110	F	斯			
	10102	9	∆ 0.02	202	000	9	40.02	20.02	3	40.02		1 000	Trace
		Ę	Mo	9H		5	Mg	F	1 !	=		וכימוס	Dto lo
(T)=1	10.07	3	-	40.2	20.02	3	40.01	20.02	000	A) 02			Varifica
(T)= Target analyte	,	< :	¥	'n	2	2	ဝွ	8	1 2	N.		בוכו	÷.
nalyte	7.05	2 5	3	40.02	20.02	3	40.02	40.02	10.04	A003		DY ICT-IVIC	20 20
	36	3 6	Si .	Ru	KO	2 :	R _r	Re	7	P		in Chi	2
	20.02	10.01	3	<0.02	20.02	000	4000	40.02	20.02	000		9/1111	· /
	la	1 6	2	Sr	Na	. 6	Δσ	S:	×	2			
	<0.02	20.02	3	40.02	40.2	20.02	3	40.02	2.0				
	11	JI.	,	Ī	H	=	3	E.	16				
	<0.02	20.02		40.02	40.02	20.02	3	<0.02	<0.02				
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Physical Characterization:

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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

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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number:

Lot #

Solvent: 20370011 Nitric Acid

2%

60.0 (IE)

Nitric Acid

Formulated By:

Giovanni Esposito

092121

Pedro L. Rentas

092121

SDS Information

Giranie

rapider

Description: Sodium (Na)

092121 58111

Recommended Storage: **Expiration Date:** 092124

Ambient (20 °C)

Nominal Concentration (µg/mL): 10000

Weight shown below was diluted to (mL): **NIST Test Number: 6UTB** Lot 3000.41 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Uncertainty Reviewed By: Expanded

g 3152a	orl-rat 3236 mg/kg 3152a	5 mg/m3	7631-99-4	20.0	10001.4	111.1274 111.1433	111.1274	27.0	0.10	99.999	10000 99.999	IN036 NAV01201511	IN036	1. Sodium nitrate (Na)
SRM	LD50	OSHA PEL (TWA)	CAS#	+/- (µg/mL)) Conc. (µg/mL) +/- (µg/mL) CAS#	Weight (g)		(%)	Purity (%)	(%)	Conc. (µg/mL)	Number	RM#	Compound
NIST	tached pg.)	(Solvent Safety Info. On Attached pg.)	(So	Uncertainty	Actual	Actual	Target	Assay	Purity Uncertainty Assay		Nominal	Lot	!	

							-
m/z->	2.5E6	m/z-> 5.0E6	2.506	m/z->	2.5E5	5.085	. Cocioin inuale (Na)
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		4		to -			
		190		90			5 mg/m3
		N 00		100			
		ŏ		ŏ			orl-rat 3236 mg/kg 3152
							153



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

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Pb	5	Fe	F	In	Н	Hf			
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Ta	S	Sr	Na	Ago	Si	Se			
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Zr	Zn	~	۲ ۱	٧	G	W			
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			

Physical Characterization:

(I)= Target analyte

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

Certified by:

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

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

^{*} All standard containers are meticulously cleaned prior to use.

^{*} Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIŞT (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).





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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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







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

Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

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

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

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

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

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

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211,
AND ICSA-1211 MIXED WITH ICSB-0710

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

ICSA M5126 M5127 M5128 M5129 M5130

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value \pm 1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value \pm 15 percent of the listed certified value.

value \pm 15 percent of the listed certified value.

ICSB

M5219

M5220

M5221

M5222

M5223

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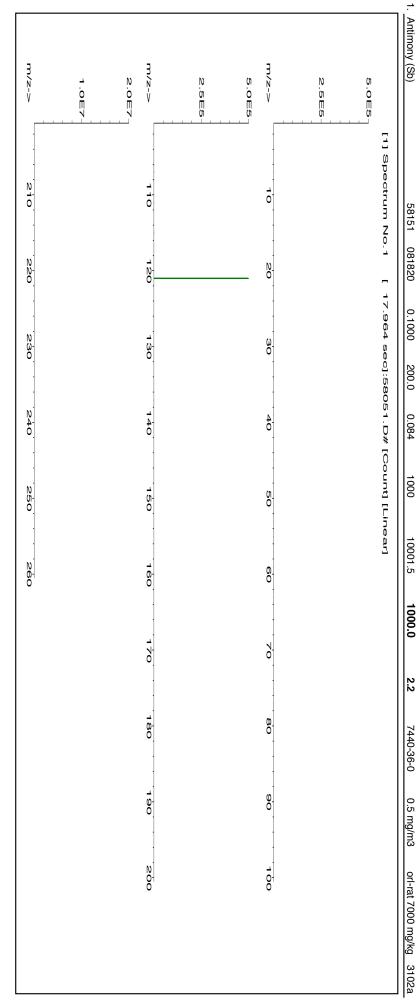
CEF EF www.absolutestandards.com



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m/z->	8.5E5		1. Antimony (Sb)	Compound		Volume s	NIST	Nominal Concentration (μg/mL):	Recommer	Ę				-	ERTIFIED WEIGHT REPORT:	
10		[1] Spectrum No.1				Volume shown below was diluted to (mL):	NIST Test Number:	ation (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	I∺	
		um No	58151 081820	Part Number		as dilutec	6	_	>	_		.	I — I	lon		
N. O			081820	Lot Number		to (mL):	6UTB	1000	Ambient (20 °C)	101524		Antimony (Sb)	101521	57051		
30		17.964 sı	0.1000	Dilution Factor		2000.25			°C)			(Sb)				
		ec]:580	200.0	Initial Vol. (mL)		0.116	5E-05									
40)51.D#[0.084	Uncertainty Pipette (mL)		Flask Uncertainty	Balance Uncertainty									
50		[17.964 sec]:58051.D# [Count] [Linear]	1000	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)		ıţy	tainty				2.0%			20370011	Lot #	
60		near]	10001.5	Initial Conc. (µg/mL)						(mL)	40.0			Nitric Acid	Solvent:	
70			1000.0	Initial Final Conc. (µg/mL)		·					Nitric Acid					
			2.2	Uncertainty +/- (µg/mL)	Expanded		Reviewed By:	tun		\	Formulated By:		Trava	10		
80			7440-36-0	(Solv				10	, (7	.:		tieranne 2	0		
90			0.5 mg/m3	(Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	SDS Information		Pedro L. Rentas	unia	A Company)	Giovanni Esposito		LACE CARE	+		Titlos
100			orl-rat 7000 mg/kg 3102a	Attached pg.) LD50	ion		101521				101521					III.lps://Absolutestallualus.com
			3102a	NIST		1									•	ards.com



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

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Verification by ICP-M5 (µ	< 0.02	W	< 0.02	Тъ	<0.2	Se	<0.02	P_{r}	<0.02	N:	<0.02	Li	< 0.02	ЭH	< 0.02	Dy	< 0.02	С	< 0.02	Al
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(T)= Target analyte

Physical Characterization:

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

Certified by:



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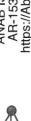
 * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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		200	Giovanni Esposito	C Pa	Pedro L. Rentas		SDS Information	OSHA PEL (TWA)	1.0 mg/m3				0			00			
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)		五	Formulated By:	No	Reviewed By:		Expanded	uncertainty +/- (µg/mL)	2.1							0			
)			Nitric Acid		1=	ŋ	1	lal Ja/mL)	0.0				70			170			
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	_	200	.,		certainty	tainty		L) Conc.		Cor									
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					5			_		3 sec			30			130			230
		2		(Ç)		3000.4	O.	Factor	0.1000	2.243									
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)		57023 100121 Vanadiu		100124 Ambient 1000	6UTB	uted to		- 1	1 1	0 -						<u></u>			, cv
						Volume shown below was diluted to (mL):	Part	Number	58123	[1] Spectrum No.1			10			110			210
		Part Number: Lot Number: Description:		Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):	NIST Test Number:	pelow				Speci						٢			N
	ORT:	Part N Lot N Desc		Expirati ended tration	T Test I	shown			date (V)	Ξ	 	1111							
	1T REP			ecomm Concen	SIN	Volume			etavana	2.0E6	1.0E6		٨	2.0E7	1.0E7	٨	5.0E8	2.5E8	Å,
	WEIGH			R				punc	nium Me	, w	,		V-2/E	W	,	~-z/w	ш	(V	W/z-v
	CERTIFIED WEIGHT REPORT:			ž				Compound	1. Ammonium Metavanadate (V)										
	빙								- -										

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

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Sb	<0.02	CB	<0.2	Ξ	<0.02	Но	<0.02	Lu	<0.02	_q N	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	ם	<0.00
As	<0.2	ပိ	<0.02	En	<0.02	II	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	E	<0.02	>	-
Ва	<0.02	Cs	<0.02	PS	<0.02	ı	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na Na	<0.2	T.	<0.02	Υ Υ	200>
Be	<0.01	ڻ	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	Ы	<0.02	Ru	<0.02	S	<0.02	E	200>	>	20.07
Bi	<0.02	ပိ	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	£	<0.02	Sm	<0.02	S	<0.02	S.	20.02	7, 2	20.02
В	<0.02	Cu	<0.02	Αn	<0.02	Pb	<0.02	PN	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	Ξ	<0.05	7.	20.02
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(T)= Target analyte

Physical Characterization:

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



Certified by:

the preparation of all standards.

^{*} 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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Certified Reference Material CRM

MS272

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

CERTIFIED WEIGHT REPORT: Part Number: 57051 051822 Lot # Solvent:

20370011 Nitric Acid

Expiration Date: Description: 051825 Antimony (Sb) 2.0% 60.0

Nitric Acid

Formulated By:

Giovanni Esposito

051822

Diovanne

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Lot Number:

Nominal Concentration (µg/mL): Recommended Storage: 6UTB 1000 Ambient (20 °C) 5E-05 Balance Uncertainty (mL)

Compound

Number

Number

Factor Dilution

Initial

Uncertainty

Nominal

Initial

Final

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL) Uncertainty

CAS#

OSHA PEL (TWA)

LD50

TSIN SRM

(Solvent Safety Info. On Attached pg.)

051822

Volume shown below was diluted to (mL): NIST Test Number: Part Lot 3000.41 0.058 Flask Uncertainty Reviewed By: Expanded Pedro L. Rentas SDS Information

m/z->	1.007	m/z-> 2.0E7	P. 55 E. 5	m/≥-> 5.0≣5	P. 5 E. 5	5.OE5	1. Antimony (Sb)
20 10		110		0		[1] Spectrum No.1	58151
N N O		120		N.			061021
230		130		a .		[17.964 sec]:58051.D# [Count] [Linear]	0.1000
				Ī		c]:58051	300.0
240		140		4 0		1.D# [Co	0.084
250		150		50		unt) [Line	1000
260		160		6 .		er]	10001.0
		170		7.			1000.0
		ò					2.1
		180		8. Ö			7440-36-0
		190		90			7440-36-0 0.5 mg/m3
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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

Certified by:

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

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* 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).

3

Certified Reference Material CRM

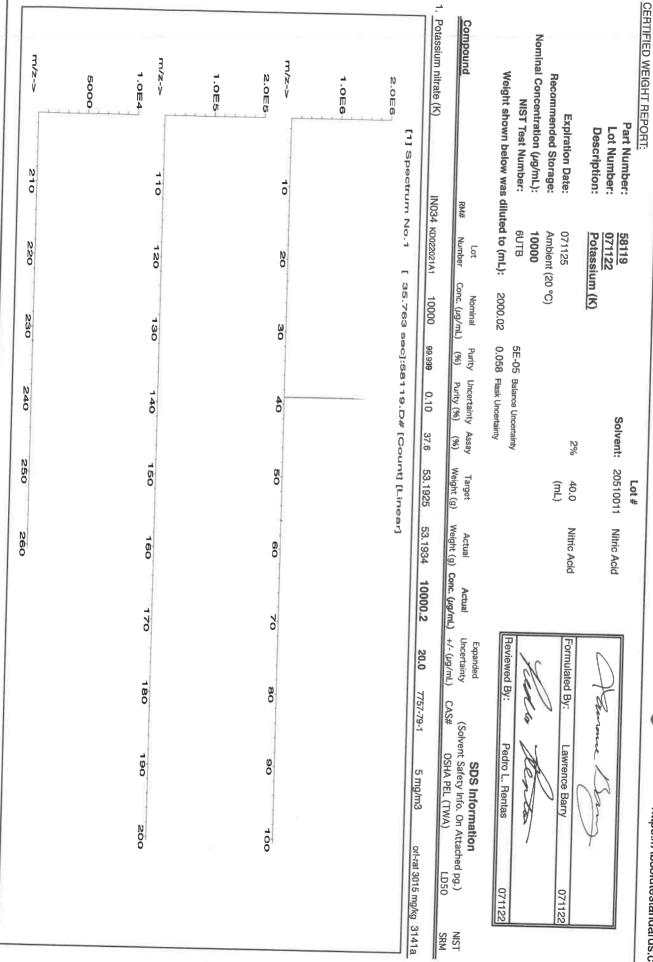
www.absolutestandards.com

800-368-1131

Absolute Standards, Inc.



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



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

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

Physical Characterization:	Al <0.02 Cd <0.02 Dy Sb <0.02 Ca <0.2 Er As <0.2 Ce <0.02 En Ba <0.02 Cs <0.02 Gd Be <0.01 Cr <0.02 Ga Bi <0.02 Cu <0.02 Ga Bi <0.02 Cu <0.02 Ga	
11 1002 41	<0.002 Hf <0.002 Li <0.002 Ni <0.002 Pr <0.002 Se <0.02 Tb <0.002 W <0.002 <0.002	Trace Metals Verification by ICP-MS (ug/ml)

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.

* All standard containers are meticulously cleaned prior to use.

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

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	Ti
\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	To Te Tim Son

Physical Characterization:

(I)= larger analyte

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

Certified by:

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

2 of 2



QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program" R: 4120 | 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.

CAUTION: 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

M5291 N15292 IN15293 NN5294 NN5295

(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

<u>For ICP-AES analysis</u>, 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.

Page 1 of 2



RMs ICV 1, 5, 6 SFAM.docx





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

Instructions for QATS Reference Material: Inorganic ICV Solutions

ICV1-1014

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) K₂Cr₂O₇ and 5% (v/v) nitric acid.

ICV6-0400

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 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)
Al	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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	The state of the s	Giovanni Esposito	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDSG	5 mg/m3		
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	iovannie	ž () ::	(So CAS#	7782-61-8	08	
	Lien	Formulated By:	Expanded Uncertainty +/- (µg/mL)	20.0		
	`			15	170	
	_	_	Actual Conc. (ug/1	10001.5		
	Nitric Acid	Nitric Acid	Actual Actual Weight (g) Conc. (ug/mL)	30.0090	160	260
	Lot # 20370011	(mL)	Target Weight (g)	30.0044	150	250
	Solvent:	5.0% srtainty uinty	Assay (%)	100.0		
	Ø.	5.0% Balance Uncertainty Flask Uncertainty	Uncertainty Assay Purity (%) (%)	0.10	04 641	240
	86	5E-05 B	Purity L	99.999		
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Tac.	Part Number: Lot Number: Description:	Expiration Date: 020425 Recommended Storage: Ambient (20 Nominal Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):		1. Iron(III) nitrate nonahydrate (Fe)	[1] Spectra	
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C	1					

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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):

5555555	Trace Metals Verification by ICP-MS (µg co.02 Li c.002 Ni c.0.10 Pr c.002 Li c.002 Ni c.0.10 Pr c.002 Li c.002 Ni c.0.10 Re c.002 Re c.002 Li c.002 Re c.003 Re	Ge 20.2 Hg 20.2	Au <0.02 Ph <0.02 Nd <0.02 Pt
Cd <0.02 Ca <0.02 Cs <0.02 Cr <0.02 Cr <0.02 Co <0.10			
8 5 5 5 5 5	-0.02-0.02-0.02-0.02-0.02	01.0>	<0.10
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(T)= Target analyte

Physical Characterization:

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



Certified by:

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CERTIFIED WEIGHT REPORT:

Part Number:

57056

Solvent:

20510011

Nitric Acid

200

40.0

Nitric Acid

Description: Lot Number:

072122 Barium (Ba)

Certified Reference Material CRM

Riograph 33

Lot #

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

Formulated By: Liovannie Giovanni Esposito appeal 2

072122

Reviewed By: Pedro L. Rentas 072122

IN023 BAD022019A1 RM# Number 5 Conc. (µg/mL) Nominal 1000 99.999 Purity 8 Uncertainty Assay Purity (%) 0.10 52.3 <u>8</u> Weight (g) 3.82417 Target Weight (g) Conc. (µg/mL) 3.82426 Actual 1000.0 Actual +/- (µg/mL) Uncertainty Expanded 2.0 10022-31-8 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information 0.5 mg/m3 orl-rat 355 mg/kg 3104a SRM TSIN

1. Barium nitrate (Ba)

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 072125

NIST Test Number:

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

m/z-> **1/2-**2 17/2-Y 2.5E6 5.0E6 2.0E5 1.0ES 2.0E6 1.OE6 [1] Spectrum No.1 210 110 0 220 120 N O [12.514 sec]:58156.D# [Count] [Linear] 130 230 30 140 240 4 250 150 Ö. 160 260 00 170 8 180 80 190 90 200 100

Certified Reference Material CRM



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

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

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Physical Characterization:

(T)= Target analyte

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



Certified by:

2 of 2

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CERTIFIED WEIGHT REPORT:

Part Number:

57056

Solvent:

20510011

Nitric Acid

200

40.0

Nitric Acid

Description: Lot Number:

072122 Barium (Ba)

Certified Reference Material CRM

Riograph 33

Lot #

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

Formulated By: Liovannie Giovanni Esposito appeal 2

072122

Reviewed By: Pedro L. Rentas 072122

IN023 BAD022019A1 RM# Number 5 Conc. (µg/mL) Nominal 1000 99.999 Purity 8 Uncertainty Assay Purity (%) 0.10 52.3 <u>8</u> Weight (g) 3.82417 Target Weight (g) Conc. (µg/mL) 3.82426 Actual 1000.0 Actual +/- (µg/mL) Uncertainty Expanded 2.0 10022-31-8 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information 0.5 mg/m3 orl-rat 355 mg/kg 3104a SRM TSIN

1. Barium nitrate (Ba)

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 072125

NIST Test Number:

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

m/z-> **1/2-**2 17/2-Y 2.5E6 5.0E6 2.0E5 1.0ES 2.0E6 1.OE6 [1] Spectrum No.1 210 110 0 220 120 N O [12.514 sec]:58156.D# [Count] [Linear] 130 230 30 140 240 4 250 150 Ö. 160 260 00 170 8 180 80 190 90 200 100

Certified Reference Material CRM



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

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

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Physical Characterization:

(T)= Target analyte

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



Certified by:

2 of 2

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Certified Reference Material CRM
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https:///Absolutestandards.com

070622 070622 Pedro L. Rentas Lawrence Barry Formulated By: Reviewed By: Nitric Acid Nitric Acid 20510011 Fot # 20.0 (mL) Solvent: 2% 0.058 Flask Uncertainty 5E-05 Balance Uncertainty 1000.12 Ambient (20 °C) Lithium (Li) Weight shown below was diluted to (mL): 57103 070622 070625 10000 **6UTB** Nominal Concentration (µg/mL): NIST Test Number: Lot Number: Description: Expiration Date: Recommended Storage: Part Number: CERTIFIED WEIGHT REPORT:

Γ						ar]	[9.619 sec]:58103.D# [Count] [Linear]	# [C	58103.D	sec]::	_	No.1	ctrum	[1] Spectrum No.1	
5	Byfill 0241 ischin	2					1								
MA	0.10 10.0 100.0134 100.0173 10000.4 20.0 7790-69-4 5 ma/m3 nd-sat 1428 ma/m NA	5 ma/m3	7790-69-4	20.0	10000.4	100.0173	100.0134	10.0	0.10	99.999	10000 89.889 0.	IN019 UZ042018A1	IN019		Lithium nitrate (Li)
SEM	LD50	RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50	CAS#	+/- (ug/mL)	Conc. (ug/mL)	Weight (g)	Weight (g)	(%)	Purity (%)	(%)	Conc. (µg/mL)	Number	RM#		БПроппа
	Attached og.)	(Solvent Safety Info. On Attached og.)	(Solv	Uncertainty	Actual	Actual	Target	Assay	Nominal Punty Uncertainty Assay. Target	Funty	Nominal	707			Commonwood
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

							Trace Me	stale	Varifics	tion	hy ICP.	MC	(lm/m/)						
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Ba	<0.02	రో	<0.02	3	<0.02	卢	<0.02	Mn	<0.02	R	ZO:02	2	Ø.02	Z	40.2	£	200	\$	500
Be	<0.01	ඊ	<0.02	පී	40.02	괊	<0.2	黑	\$07	Δ.	<0.02	Ra	900	J.	<0.02	ع ا	8	*	200
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Physical Characterization:

(T)= Target analyte

Certified by:

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

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

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

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

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

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

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

Part # 57103

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Certified Reference Material CRM

MSYCK

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CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 момпакта. Compound Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: 58112 120922 6UTB Ambient (20 °C) 10000 120925 Magnesium (Mg) 텇 Conc. (µg/mL) 3000.41 10000 Nominal 0.058 Flask Uncertainty 89.999 0.10 5E-05 Balance Uncertainty Purity Uncertainty Assay 3 Purity (%) Solvent: 3 6.74 343.2213 343.2669 10001.3 20510011 Weight (g) (m) 0.00 Nitric Acid Nitric Acid Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) Formulated By: Reviewed By: Uncertainty Expanded 20.0 Diovanie 13446-18-9 CAS# (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 Giovanni Esposito Pedro L. Rentas greats OSHA PEL (TWA) SDS Information ort-rat 5440 mg/kg 3131a

120922

ISIN SRM

120922

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			N O	2	ö		

Part # 58112

Certified Reference Material CRM



Absolute Standards, Inc. 300-368-1131

www.absolutestandards.com



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

							Trace Me	etals	Verifical	tion	by ICP-N	4S (E	(d/m/b)						
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As	Q	පී	<0.02	룝	40.02	耳	<0.02	Mg	T	ő	<0.02	4Z	<0.02	Ag	<0.02	F	40.02	>	<0.02
Ва	<0.02	ඊ	<0.02	ਣ	<0.02	ㅂ	<0.02	Mn	<0.02	Pa	<0.02	2	40 .02	, K	40.2	F	40.02	5	200
æ	40,01	ర	<0.02	පී	<0.02	윤	<0.2	Hg	40.2	Д,	<0.02	Ru	60.05	Š	40.02	<u>,</u> E	2005	>	200
洒	₹0.02	රි	<0.02	පී	<0.02	្ន	<0.02	Mo	<0.02	盂	<0.02	Sm	<0.02	S	<0.02	S.	200	, Z	200
В	<0.02	õ	<0.02	Υn	<0.02	Pb	<0.02	PN	<0.02	×	<0.2	လွ	<0.02	Ţ	40.05	F	0.02	Z	000

(T) = Target analyte

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.

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

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

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

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

CERTIFIED WEIGHT REPORT:

M5494 Certified Reference Material CRM



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m/z->	1.0E7 5.0E6	m/z-> 1	8	m/2->	1.0E5	[1] Spec	Nickel(II) nitrate hexahydrate (Ni)	Compound	Volume shown below was diluted to (mL):	NIST Test Number:	Recommended Storage: Nominal Concentration (µg/mL):	Expiration Date:	Lot Number: Description:	Part Number:	CERTIFIED WEIGHT REPORT:
0		110	i			[1] Spectrum No.1	58128 (Part Number	was diluted	60			100		
220		120	8	8		Г	033122	Lot Number	to (mL):	60ТВ	Ambient (20 °C)	011226	011223 Nickel (Ni)	57028	
230		130	Q	3		.135 se	0.1000	Dilution	2000.02		Ö				
						c]:5802	200.0	Initial Vol. (mL)	0.058 F	5E-05 E					
240		140	5			8.D# [C	0.084	Uncertainty Pipette (mL)	Flask Uncertainty	Balance Uncertainty					
250		150	5 O			9.135 sec]:58028.D# [Count] [Linear]	1000	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)	Q	ainty		2.0%		20510011	Lot #
200		160	0 0			ear]	10000.9	Initial Conc. (µg/mL)				40.0		Nitric Acid	Solvent:
		170	70				1000.0	Initial Final Conc. (µg/mL) Conc. (µg/mL)				Nitric Acid			
		ò	0				2.2	Expanded Uncertainty +/- (µg/mL)		Reviewed By:	W	Formulated By:	\$.		7
		180	80				13478-00-7	CAS		< (10	Ву:	Diovannie		
		190	90				1	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50	. one of morning	Padro I Ran		Giovanni Esposito	Capacito	1	
		200	100					SDS Information Safety Info. On Attacl SHA PEL (TWA)		200	1	osito	B		
			·				orl-rat 1620 mg/kg 3136	hed pg.) NIST	011220	011223		011223			

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

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

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et analy	×	Pt	P	Ы	°S	₽	Z		מסח	
тe	<0.2	<0.02	<0.02	<0.02	<0.02	40.02	Т		DY ICP-N	
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	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		J/mL)	
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	Η	Sn	Tm	∄	1	Te	Tb	I		
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	<0.02	40.02	<0.02	<0.02	<0.02	<0.02	<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 preparation of all standards.
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- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
 * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com 031523 031523 Giovanni Esposito Pedro L. Rentas Liovanni Formulated By: Reviewed By: Certified Reference Material CRM Nitric Acid Nitric Acid Solvent: 21110221 Fot# 60.0 (mL) % 5E-05 Balance Uncertainty 0.058 Flask Uncertainty 3000.41 Ambient (20 °C) Calcium (Ca) Weight shown below was diluted to (mL): 031523 031526 10000 **6UTB** Recommended Storage: Nominal Concentration (µg/mL): Part Number: Lot Number: Description: **Expiration Date:** NIST Test Number: CERTIFIED WEIGHT REPORT:

Compound	RM#	Lot Number	Nominal Purity Conc. (µg/mL) (%)	Punty (%)	Purity Uncertainty Assay (%) Purity (%) (%)		Target Weight (g)	Actual Weight (g)	Expanded Actual Actual Uncertainty (Sc Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS#	Expanded Uncertainty +/- (ug/mL)	(Solv	SDS Information (Solvent Safety Info. On Attached pg.) NS# OSHA PEL (TWA) LD50	Attached pg.) LD50	NIST
1. Calcium carbonate (Ca)	IN014	INO14 caboragezat	10000 99.999	666.66	0.10	38.9	75.1990	75.2093	10001.4	20.0	471-34-1	5 mg/m3	ort-rat	3109a
[1] S ₁	[1] Spectrum No.1		4.00	8ec]:6	12.514 sec]:58120.D# [Count] [Linear]	<u> </u>	unti (Line	ari						
1.0E4														
m/z->	0	.0		000	.0	400400	0	0	2		0		001	
2. 4 4														
m/z->	0	120		90	140		150	160	071	0	180	190		
6.0E4														
m/z->	019	220		230	240		250	260						





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

						Trace Me	tals	Verificat	ioi	by ICP-N	MS ($(\mu g/m\Gamma)$		r				
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707	ප	<0.02	δ	40.05	H	<0.02	II.	<0.02	Z	<0.02	ď	<0.02	Se	<0.2	13	<0.02	≥	<0.02
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100	Ö	<0.02	ජි	40.02	Ŗ	<0.2	Hg	40.2	م	<0.02	æ	<0.02	స	<0.02	Ę,	<0.02	¥	₹0.05
707	රි	40.02	පි	₹0.02	3	₹0.02	Wo	<0.02	五	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	2	₹0.02
707	♂	<0.02	Αū	<0.02	2	<0.02	PN	<0.02	×	40.2	S	<0.02	Ta	<0.02	Ξ	<0.02	Z	40.02
	6.00 6.00 6.00 6.00 6.00 6.00		3 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Cd	Cd	Cd	Cd	Cd	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ca T En -0.02 Ho -0.02 Li -0.02 Ce -0.02 Eu -0.02 in -0.02 Mg -0.02 Cr -0.02 Gd -0.02 Fe -0.02 Mn -0.02 Co -0.02 Ge -0.02 Fe -0.02 Mo -0.02 Cu -0.02 Au -0.02 Fe -0.02 Mo -0.02	Cd -60.02 Dy -60.02 Hf -60.02 Li -60.02 Ni Ca T En -60.02 Ho -60.02 Lu -60.02 Nh Ca -60.02 Eu -60.02 In -60.02 Mn -60.02 Pd Cr -60.02 Ga -60.02 Fe -60.2 Hg -60.2 Pr Co -60.02 Ga -60.02 La -60.02 Rr -60.02 Rr Cu -60.02 Au -60.02 Pr -60.02 Rr	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Ca T En -6.002 Ho -6.002 Lu -6.002 Nh -6.002 Ce -6.002 Eu -6.002 In -6.002 Mg -6.012 Nh -6.002 Cr -6.002 Gd -6.002 Fe -6.02 Mn -6.02 Pd -6.02 Cr -6.002 Gg -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Cu -6.002 Au -6.002 In -6.002 R -6.002 Cu -6.002 Au -6.002 Ph -6.002 R -6.002	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Pr Ca T Ea -6.002 Ho -6.002 Lu -6.002 Nb -6.002 Rc Ce -6.002 Eu -6.002 Ir -6.002 Mn -6.002 Rb -6.002 Rb Cr -6.002 Ga -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Rr Co -6.002 Ga -6.002 La -6.002 Rr -6.002 Rr Co -6.002 Ga -6.002 Pr -6.002 Rr -6.002 Rr Cu -6.002 Au -6.002 Pr -6.002 Rr -6.002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Ca T Ba -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Ce -0.02 Bu -0.02 Ir -0.02 Mg -0.01 Os -0.02 Rb -0.02 Cr -0.02 Ga -0.02 Mn -0.02 Pr -0.02 Ru -0.02 Cr -0.02 Ga -0.02 Hg -0.2 Pr -0.02 Ru -0.02 Cr -0.02 Ga -0.02 Hg -0.2 Pr -0.02 Ru -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02 Cu -0.02 Au -0.02 Nd -0.02 <th>Cd -d002 Dy -d002 Hf -d002 Li -d002 Ni -d002 Re -d002 Si Ca T Ea -d002 Ho -d002 Lu -d002 Nb -d002 Re -d002 Si Ca -d002 Ea -d002 Hr -d002 Mn -d002 Rh -d002 Na Cr -d002 Ga -d002 Hg -d02 Pr -d002 Ru -d002 Na Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Cu -d002 Au -d002 Nd -d002 Rr -d002 Sr -d002 Sr -d002 Sr</th> <th>Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Se -0.02 Ca T Eu -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Si -0.02 Ce -0.02 Eu -0.02 In -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Gd -0.02 Ir -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Ru -0.02 Sr -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Ba -0.02 Na -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Au -0.02 Rr -0.02 Sr</th> <th>Cd 4002 Dy 4002 H 4002 Li 4002 Ni 4002 Pr 4002 Se 402 Th Ca T Ea 4002 Ha 4002 Lu 4002 Nb 4002 Rb 4002 Tr Ca 4002 Eu 4002 Ha 4002 Pd 4002 Rb 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Sr 4002 Sr 4002 Cr 4002 Au 4002 Rr 4002 Rr 4002 Sr 4002 Sr 4002 Sr</th>	Cd -d002 Dy -d002 Hf -d002 Li -d002 Ni -d002 Re -d002 Si Ca T Ea -d002 Ho -d002 Lu -d002 Nb -d002 Re -d002 Si Ca -d002 Ea -d002 Hr -d002 Mn -d002 Rh -d002 Na Cr -d002 Ga -d002 Hg -d02 Pr -d002 Ru -d002 Na Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Cu -d002 Au -d002 Nd -d002 Rr -d002 Sr -d002 Sr -d002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Se -0.02 Ca T Eu -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Si -0.02 Ce -0.02 Eu -0.02 In -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Gd -0.02 Ir -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Ru -0.02 Sr -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Ba -0.02 Na -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Au -0.02 Rr -0.02 Sr	Cd 4002 Dy 4002 H 4002 Li 4002 Ni 4002 Pr 4002 Se 402 Th Ca T Ea 4002 Ha 4002 Lu 4002 Nb 4002 Rb 4002 Tr Ca 4002 Eu 4002 Ha 4002 Pd 4002 Rb 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Sr 4002 Sr 4002 Cr 4002 Au 4002 Rr 4002 Rr 4002 Sr 4002 Sr 4002 Sr

(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

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

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

^{*} 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). * All Standards should be stored with caps tight and under appropriate laboratory conditions.

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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com 031523 031523 Giovanni Esposito Pedro L. Rentas Liovanni Formulated By: Reviewed By: Certified Reference Material CRM Nitric Acid Nitric Acid Solvent: 21110221 Fot# 60.0 (mL) % 5E-05 Balance Uncertainty 0.058 Flask Uncertainty 3000.41 Ambient (20 °C) Calcium (Ca) Weight shown below was diluted to (mL): 031523 031526 10000 **6UTB** Recommended Storage: Nominal Concentration (µg/mL): Part Number: Lot Number: Description: **Expiration Date:** NIST Test Number: CERTIFIED WEIGHT REPORT:

Compound	RM#	Lot Number	Nominal Purity Conc. (µg/mL) (%)	Punty (%)	Purity Uncertainty Assay (%) Purity (%) (%)		Target Weight (g)	Actual Weight (g)	Expanded Actual Actual Uncertainty (Sc Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS#	Expanded Uncertainty +/- (ug/mL)	(Solv	SDS Information (Solvent Safety Info. On Attached pg.) NS# OSHA PEL (TWA) LD50	Attached pg.) LD50	NIST
1. Calcium carbonate (Ca)	IN014	INO14 caboragezat	10000 99.999	666.66	0.10	38.9	75.1990	75.2093	10001.4	20.0	471-34-1	5 mg/m3	ort-rat	3109a
[1] S ₁	[1] Spectrum No.1		4.00	8ec]:6	12.514 sec]:58120.D# [Count] [Linear]	<u> </u>	unti (Line	ari						
1.0E4														
m/z->	0	.0		000	.0	400400	0	0	2		0		001	
2. 4 4														
m/z->	0	120		90	140		150	160	071	0	180	190		
6.0E4														
m/z->	019	220		230	240		250	260						





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

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

						Trace Me	tals	Verificat	ioi	by ICP-N	MS ($(\mu g/m\Gamma)$		r				
SHEW SHEET	STATE OF THE PARTY OF				SIGNATURE .	STON SAFETY SAGE	S. Parlie	THE SHARE SHARE	Series .		Sec.	STREET, STREET	THE PERSON	THE PERSON NAMED IN	THE PERSON			
707	ප	<0.02	δ	40.05	H	<0.02	II.	<0.02	Z	<0.02	ď	<0.02	Se	<0.2	13	<0.02	≥	<0.02
700	రో	H	卢	₹0.02	윒	20.02	3	<0.02	ź	<0.02	2	<0.02	ន	<0.02	Į.	40.02	Þ	₹0.05
07	පී	40.02	超	<0.02	Я	<0.02	Mg	40.01	ő	<0.02	쥪	<0.02	Ag	<0.02	F	<0.02	>	<0.02
707	ర	<0.02	පි	<0.02	片	<0.02	Mn	<0.02	Z	<0.02	2	<0.02	ž	<0.2	Ę	<0.02	¥9	40.02
100	Ö	<0.02	ජි	40.02	Ŗ	<0.2	Hg	40.2	م	<0.02	æ	<0.02	స	<0.02	Ę,	<0.02	¥	₹0.05
707	රි	40.02	පි	₹0.02	3	₹0.02	Wo	<0.02	五	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	2	₹0.02
707	♂	<0.02	Αū	<0.02	2	<0.02	PN	<0.02	×	40.2	S	<0.02	Ta	<0.02	Ξ	<0.02	Z	40.02
	6.00 6.00 6.00 6.00 6.00 6.00		3 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Cd	Cd	Cd	Cd	Cd	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ca T En -0.02 Ho -0.02 Li -0.02 Ce -0.02 Eu -0.02 in -0.02 Mg -0.02 Cr -0.02 Gd -0.02 Fe -0.02 Mn -0.02 Co -0.02 Ge -0.02 Fe -0.02 Mo -0.02 Cu -0.02 Au -0.02 Fe -0.02 Mo -0.02	Cd -60.02 Dy -60.02 Hf -60.02 Li -60.02 Ni Ca T En -60.02 Ho -60.02 Lu -60.02 Nh Ca -60.02 Eu -60.02 In -60.02 Mn -60.02 Pd Cr -60.02 Ga -60.02 Fe -60.2 Hg -60.2 Pr Co -60.02 Ga -60.02 La -60.02 Rr -60.02 Rr Cu -60.02 Au -60.02 Pr -60.02 Rr	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Ca T En -6.002 Ho -6.002 Lu -6.002 Nh -6.002 Ce -6.002 Eu -6.002 In -6.002 Mg -6.012 Nh -6.002 Cr -6.002 Gd -6.002 Fe -6.02 Mn -6.02 Pd -6.02 Cr -6.002 Gg -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Cu -6.002 Au -6.002 In -6.002 R -6.002 Cu -6.002 Au -6.002 Ph -6.002 R -6.002	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Pr Ca T Ea -6.002 Ho -6.002 Lu -6.002 Nb -6.002 Rc Ce -6.002 Eu -6.002 Ir -6.002 Mn -6.002 Rb -6.002 Rb Cr -6.002 Ga -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Rr Co -6.002 Ga -6.002 La -6.002 Rr -6.002 Rr Co -6.002 Ga -6.002 Pr -6.002 Rr -6.002 Rr Cu -6.002 Au -6.002 Pr -6.002 Rr -6.002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Ca T Ba -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Ce -0.02 Bu -0.02 Ir -0.02 Mg -0.01 Os -0.02 Rb -0.02 Cr -0.02 Ga -0.02 Mn -0.02 Pr -0.02 Ru -0.02 Cr -0.02 Ga -0.02 Hg -0.2 Pr -0.02 Ru -0.02 Cr -0.02 Ga -0.02 Hg -0.2 Pr -0.02 Ru -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02 Cu -0.02 Au -0.02 Nd -0.02 <th>Cd -d002 Dy -d002 Hf -d002 Li -d002 Ni -d002 Re -d002 Si Ca T Ea -d002 Ho -d002 Lu -d002 Nb -d002 Re -d002 Si Ca -d002 Ea -d002 Hr -d002 Mn -d002 Rh -d002 Na Cr -d002 Ga -d002 Hg -d02 Pr -d002 Ru -d002 Na Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Cu -d002 Au -d002 Nd -d002 Rr -d002 Sr -d002 Sr -d002 Sr</th> <th>Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Se -0.02 Ca T Eu -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Si -0.02 Ce -0.02 Eu -0.02 In -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Gd -0.02 Ir -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Ru -0.02 Sr -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Ba -0.02 Na -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Au -0.02 Rr -0.02 Sr</th> <th>Cd 4002 Dy 4002 H 4002 Li 4002 Ni 4002 Pr 4002 Se 402 Th Ca T Ea 4002 Ha 4002 Lu 4002 Nb 4002 Rb 4002 Tr Ca 4002 Eu 4002 Ha 4002 Pd 4002 Rb 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Sr 4002 Sr 4002 Cr 4002 Au 4002 Rr 4002 Rr 4002 Sr 4002 Sr 4002 Sr</th>	Cd -d002 Dy -d002 Hf -d002 Li -d002 Ni -d002 Re -d002 Si Ca T Ea -d002 Ho -d002 Lu -d002 Nb -d002 Re -d002 Si Ca -d002 Ea -d002 Hr -d002 Mn -d002 Rh -d002 Na Cr -d002 Ga -d002 Hg -d02 Pr -d002 Ru -d002 Na Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Cu -d002 Au -d002 Nd -d002 Rr -d002 Sr -d002 Sr -d002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Se -0.02 Ca T Eu -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Si -0.02 Ce -0.02 Eu -0.02 In -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Gd -0.02 Ir -0.02 Mn -0.02 Rb -0.02 Na -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Ru -0.02 Sr -0.02 Ca -0.02 Ga -0.02 Hg -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Ba -0.02 Na -0.02 Rr -0.02 Sr -0.02 Ca -0.02 Au -0.02 Rr -0.02 Sr	Cd 4002 Dy 4002 H 4002 Li 4002 Ni 4002 Pr 4002 Se 402 Th Ca T Ea 4002 Ha 4002 Lu 4002 Nb 4002 Rb 4002 Tr Ca 4002 Eu 4002 Ha 4002 Pd 4002 Rb 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Sr 4002 Sr 4002 Cr 4002 Au 4002 Rr 4002 Rr 4002 Sr 4002 Sr 4002 Sr

(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

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

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

^{*} 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). * All Standards should be stored with caps tight and under appropriate laboratory conditions.

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800-368-1131 www.absolutestandards.com	100	Å		•	Sertified .	Refere	Since Mai	Certified Reference Material CRM	1/203 (~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	ANAB ISO 17034 Accredited AR-1539 Certificate Number ttps://Absolutestandards.com	credited Number rds.com
CERTIFIED WEIGHT REPORT:						1	Lot#			る				
Fart Number: Lot Number: Description:		57182 061522 Lead (Pb)			Solvent:		20510011	Nitric Acid		Hieram	ranvie Ed	peate		
Expiration Date:		081525				%	40.0	Nitric Acid		Formulated By:	Giovann	Giovanní Esposito	061522	
Recommended Storage: Nominal Concentration (µg/mL):		Ambient (20 °C) 10000	Ő				(TE)			Ph	May 1	C/S		
NIST Test Number: 6UTB Weight shown below was diluted to (mL):	r: 6U as diluted		2000.02	5E-05 B 0.058 FI	5E-05 Balance Uncertainty 0.058 Flask Uncertainty	inty 4				Reviewed By:	Pedro L	Pedro L. Rentas	061522	
Compound	RM#	Lot Number C	Lot Nominal Purity Uncertaint Number Conc. (µg/ml.) (%) Purity (%)	Purity (×	- 1	Target Weight (g)	Expanded Actual Actual Uncertainty Weight (g) Conc. (µg/mL) +/- (µg/mL)	Actual	Expanded Uncertainty (4+-(µg/mL) CAS#	SD: (Solvent Safe S# OSHA	SDS information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDSC	l pg.) LD50	NIST

SRM

1. Lead(II) nitrate (Pb)	INO29 PBD122016A1	10000	88.888	0.10	62.5	32.0006	32.0041 10001.1		20.0	10099-74-8	0.05 mg/m3	intryne-rat 83 mo/kg 3128	3128
1.0E7	[1] Spectrum No.1	17.284 sec]:58182.D# [Count] [Linear]	ec]:58	82.D*	Cour	nt] [Line		1				p h	
S.0E8													
m/z->> 2.0€6	0 P	O		.0		0	9	02		08	0	100	
1.0E6													
m/z->	1100	190		04	i) Er	150	160	170	Ī	180	0.00	000	
5.0ES													
Å	220	230		240		250	260						

Lot # 061522

Certified Reference Material CRM



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

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

						Ī	Trace Me	stals	Verifica	tion	by ICP-	SM	(ma/m)		,				
Section 1	May be seen and	į	WORNING STREET	Name of Street	3-5-40. 1. 1. 1. 3-2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	-	THE PROPERTY OF THE PARTY OF TH	CAMPBOOK.					2	Commence of the last					
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i	200	3 6	70.00	5 .	20.02	3	70:05	WIO	<0.02	Σ,	<0.02	SH	<0.02	S	<0.02	Sn	40.02	Z	40.02
	70.05	3	70'0>	Au	<0.02	£	T	ž	40.02	×	\$ \$	S	<0.02	Ę	CD 02	Ę	29	2	8

Physical Characterization:

(T)= Target analyte

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



Certified by:

Lot # 061522

^{*} 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.

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

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

CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

CERTIFICATE OF ANALYSIS

Date: 8/3/2022

MS631 MS632 MS633 MS634

Lot No 820803

Hydrogen Peroxide, ACS

Reagent Grade

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

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

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

Gina M. Rambo-Office Manager

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Certified Reference Material CRM

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CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: 58024 060523 Chromium (Cr) 21110221 Lot # Nitric Acid Solvent: Lavense

2.0% 40.0 Nitric Acid

(III)

Formulated By:

Lawrence Barry

060523

060523

Nominal Concentration (µg/mL): Recommended Storage: **Expiration Date:** 1000 Ambient (20 °C) 060526

Compound Volume shown below was diluted to (mL): NIST Test Number: Number Part **BTU9** Number Lot 2000.02 Factor Dilution Vol. (mL) Pipette (mL) Conc. (µg/mL) 0.058 5E-05 Initial Flask Uncertainty Balance Uncertainty Uncertainty Nominal Conc. (µg/mL) Conc. (µg/mL) Initial Final Reviewed By: +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) Pedro L. Rentas **SDS Information**

P20

TSIN SRM

3112a

 Chromium(III) nitrate nonahydrate (Cr) 58124 071122 0.1000 200.0 0.084 1000 10000.1 1000.0 12 7789-02-8 0.5 mg(Cr)/m3 ort-rat 3250 mg/kg

m/z->	N 5 10	5.0E5	5.0E5	m/z->	5000	1.004
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240		140		ò		
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		170		70		
		380		8 2.		
		0				
		190		90		
		N 0- 0		100		
		Ŏ		0		

Part # 58024



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

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	==	Sn	Tm	Ħ	ᄇ	급	176			
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	<0.02	< 0.02	<0.02	<0.02	40.02	40.02	<0.02	SALES OF STREET		

(I)= larget analyte

Physical Characterization:

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

Certified by:

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

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

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Certified Reference Material CRM

M5697 B: 10/27/23

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

CERTIFIED WEIGHT REPORT:	l=						Lot #	Solvent:						L:
Pe	Part Number: Lot Number: Description:	O look life	58029 102523 Copper (Cu)	9			24002546	Nitric Acid				M		
							2.0%	40.0	Nitric Acid	Formulated By:	šy:	Benson Chan	102523	
Exp	Expiration Date:		102526	2				(mL)		,	0	D		
Nominal Concentration (µg/mL):	ion (µg/mL):	<u></u> >	1000	S						M	N	tento		
NIST T	NIST Test Number:	0	втв		5E-05	Balance Uncertainty	inty			Reviewed By:		Pedro L. Rentas	102523	
Volume sh	Volume shown below was diluted to (mL):	diluted	1 to (mL):	2000.02	0.058	Flask Uncertainty	ч							ū
										Expanded		SDS information	tion	
Compound	Z	Part	Lot	Dilution	Initial Vol. (ml.)	Uncertainty Pipette (ml.)	Nominal	Initial	Final	Uncertainty	(Solv	(Solvent Safety Info. On Attached pg.)	Attached pg.)	NIST
					von (mr.)	son (min) s species (min)	Const. (Agy ann)	Course (Jage cont.)	Course (hgy min.)	the Organization	COLON	(1117)	E-30	Civia
Copper(II) nitrate trihydrate (Cu)		58129	100223	0.1000	200.0	0.084	1000	10000.1	1000.0	20	10031-43-3	1 mg/m3	ori-rat 794 mg/kg	3114
1.0E6	[1] Spectrum No.1	Z	_	3.422 s	əc]:58)29.D# [C	33.422 sec]:58029.D# [Count] [Linear]	near]	en.					
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5.0E7														
2.567														
m/z->	110		120	130		140	150	160	170		180	190	200	
2.067														
1.027														
m/z->	210		220	230		240	250	260						

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

		_				_	_	Comments.	-
	Ľ	<u>в</u>	Ве	Ва	As	Sb	Δ		
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	Nd	Мо	Hg	M	Mgg	Lu	<u> </u>		letals
(T) = Target analyte	A0,02	<0.02	40.2	40.02	10.05	40.02	40.02		Verifica
et anal	×	7	ק	Ъ	တ္တ	3	Z		-
vie	40.2	40.02	40.02	40.02	40.02	<0.02	<0.02	27 101	-4-10-14
	&	Sm	Ru	짱	Rh	Re	Pr	G	
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	Ta	Ø	Sr	Z	Ag	S:	Š		
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	77	Sn	F	Ħ	::	Te	급		
	40.02	40.02	40.02	40.02	40.02	<0.02	40.02		
	Zr	25	ĸ	¥	<	ď	W		
	<0.02	40.02	40.02	40.02	40.02	∆ 0.02	₹0.02		

1.1

Physical Characterization:

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

Certifled by:

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ırt # 58029

2 of 2

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Certified Reference Material CRM

M5648 8: 10/23/23

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

CERTIFIED WEIGHT REPORT: 1. Manganese(II) nitrate tetrahydrate (Mn) Compound Nominal Concentration (µg/mL): m/z-> m/z-> M/Z-V 5.OE7 1.0≣8 5.0厘7 1,0E8 2.5E6 5.0E6 Recommended Storage: Volume shown below was diluted to (mL): **NIST Test Number: Expiration Date:** Part Number: [1] Spectrum No.1 Lot Number: Description: 110 210 0 58125 Number Part 58025 102623 **BTUB** 1000 Ambient (20 °C) 102626 Manganese (Mn) 071123 120 Number 20 Ĕ [34.243 sec]:57025.D# [Count] [Linear] 3000.41 0.1000 Factor Dilution 130 30 Vol. (mL) Pipette (mL) Conc. (µg/mL) 300.0 0.058 5E-05 Initial Flask Uncertainty Balance Uncertainty 240 140 Uncertainty 40 0.084 24002546 Nominal 2.0% Lot # 1000 250 150 0 Conc. (µg/mL) Conc. (µg/mL) Nitric Acid Solvent: 10000.1 Initial <u>a</u> 60.0 260 160 00 Nitric Acid 1000.0 Final 170 0 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Expanded <u>2</u> 180 80 20694-39-7 CAS# (Solvent Safety Info. On Attached pg.) 190 OSHA PEL (TWA) 90 Pedro L. Rentas Benson Chan SDS Information 5 mg/m3 200 100 ort-rat >300mg/kg P50 102623 102623 3132 SRM

Printed: 10/26/2023, 1:20:32 PM



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

	_		!	3	3	Š	2	5	3	3	ž	3	7	3	À	3	?	3	0
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△0.02	×	40.02	Tm	40.02	Sr	<0.02	Ru	<0.02	קי	40.2	Ж	40.2	Fe	40.02	Ç	<0.02	ť	40.01	Ве
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A0,02	Ϥ	40.02	Te	A0.02	S	<0.02	₽,	40.02	\$	40.02	Ę	6.02	Ж	₹0.02	퍾	<0.2	ប្ច	40.02	Sb.
40.02	₩	<0.02	끕	40.2	8	<0.02	2	<0.02	Z	40.02	E	<0.02	Hf	<0.02	Dy	<0.02	δ	40.02	≥
					200000000000000000000000000000000000000	Wassing Sales	West State	SCHOOL SOURCE	BREEDOWN	SESTIMATION OF STREET	WILLIAM STATE	Hermone Committee	Property.	SANDSCHIEBER	SALES STATES			Section 1	
						J/mL)	in Chi	by ICP-N	tion	verifica	letais	I race M							Γ

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

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

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Certified Reference Material CRM MSTHT

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

CERTIFIED WEIGHT REPORT: Part Number: R: 12/20/23 Lot #

Nitric Acid

Solvent: 24002546

2%

Nitric Acid

Formulated By:

Lawrence Barry

100923

60.0

Lot Number: Description: 57082 100923 Lead (Pb)

Expiration Date: 100926

Recommended Storage: **NIST Test Number:** BIN9 1000 Ambient (20 °C)

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): 3000.41 0.06 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By:

Cot

Nominal

Purity

Uncertainty Assay

			1000.0 2.0 10099-74-8 0.05 mg/m3	0 2.0 10		0.10 62.5 4.80071 4.80077	62.5	0.10	99.999	1000	N029 PBD122016A1	Lead(II) nitrate (Pb)
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Target Weight (a) Con Actual Actual Uncertainty +/- (ua/mL) Expanded #SAC SDS Information
(Solvent Safety Info. On Attached pg.)
(SONA PEL (TWA) TSIN

Pedro L. Rentas

100923

m/2->	1.0E6	m/z->	5.OE4	m/z->	5.0 M4	1.0E5
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Part # 57082

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40,02	40.02	40.2	△0.02	10.0	2002	3	40.02		Verifica	
K	7	7	P	Ç	N	1	Z		tion	١
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Zr	Zn	×	44	۷	c	4	W			
₫,02	40.02	₫.02	△0.02	40.02	40.02	20.02	2003			

Physical Characterization:

(1)= Target analyte

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

Certified by:

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

the preparation of all standards.

- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
 * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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CERTIFIED WEIGHT REPORT:

Part Number:



Certified Reference Material CRM

Lot # M5752 M5753 Solvent:

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

, 12/15/23

24002546

Nitric Acid

18 Components - Water Matrix ILM 05.3 ICP-AES Spike Sample

5.0%

(mL)

Nitric Acid

Formulated By:

Giovanni Esposito

112823

Divarrie

absolute L

Ambient (20 °C) 112826

Recommended Storage:

Expiration Date:

Description: Lot Number:

Nominal Concentration (µg/mL): Volumes shown below were diluted to (mL): **NIST Test Number:** ana ana Varied 500.06 0.058 5E-05 Flask Uncertainty **Balance Uncertainty** Reviewed By: Pedro L. Rentas

Compound

Number Part

5

Dilution Factor

hitial

Uncertainty

Nominal

Vol. (ml.) Pipette (ml.) Conc. (µg/ml.)

Conc. (µg/ml.) Conc. (µg/ml.)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

P20

SRY NIST

112823

Firma Uncertainty Expanded (Solvent Safety Info. On Attached pg.) SDS Information

	Zinc nitrate hexahydrate (Zn)	_	17 American made (ii)	16 Thellium sitrate (Th	15. Silver nitrate (An)	4. Salenium(IV) oxide (Se)	13. Nickel(II) nitrate hexahydrate (Ni)	12. Manganese(II) nitrate tetrahydrate (Mn)	11. Lead(II) nitrate (Pb)	IC. Iron (F-B)	Copper(ii) illiaw uniyorate (Cu)	9 Conner(III) pitrate t-ib	8. Cobalt(II) nitrate hexahydrate (Co)	 Chromium(III) nitrate nonahydrate (Cr) 	o. Caurisum minale leganyorate (Co)	S Cadmin all the late	5. Bervilium nitrate (Be)	Barium nitrate (Ba)	J. Arsenic (As)	E Primingly (SQ)	Auminum nitrate nonahydrate (Al) Artimony (St.)
	ate (Zn)	idate (V)			7	in the state of th	hudrate (Ni)	tetrahydrate (Mn)			(Cu)	Indiana (Oct.)	hydrata (Co)	nonahydrate (Cr)	inydrate (Cd)						ahydrate (Al)
	58130	58123	180/0	740/0	1004	02100	7010	70107	57080	58126	620/c	1000	50107	57024	57048	9,004		58156	57033	57051	58113
	063023	082823	061322	0/1123	040123	002023	00000	074400	101993	051523	102523	CZENCO	050000	060523	071123	525201	100EOO	050000	090723	041823	071123
	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0000	0.0200	0000	0.0100	0.0250	0.0000		0.0200	0.0050	0.0050	0.000	0000	0.0040	0.0100	0.0200
	25	2.50	2.50	2.50	2.50	2.50	25.5			5.00	12.50	06.2		5	2.50	2.50	5	500	2.00	5.00	10.0
6.017	0017	0.017	0.017	0.017	0.017	0.017	710.0	0.042		0.017	0.084	0.017	0.072	000	0.017	0.017	240.0		0.017	0.017	0.042
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1000.0	10000	10000.0	1000.0	1000.6	1000.0	10000.4	10000.1	0.001	6.100	10001	1000.0	10000.0	0.000	1000	1001.5	1000.0	1.00001	1000.0	1000	1000.0	10000.1
90.0	000	500	5.00	5.00	5.00	50.0	50.0	2.00	100.0	200	25.0	50.0	0.02	3	3	5.00	200.0	1.60	4	10.0	200.0
0.7		07	0.07	0.07	0.07	0.7	0.7	0.02	0.7		0.3	0.7	0.17	0.07	200	0.07	1.7	0.00		0.07	1.7
10196-18-6	0-00-000	7900 EE 6	10102-45-1	7761-88-8	7446-08-4	13478-00-7	20694-39-7	10099-74-8	7439-B9-6	1000	10031-43-3	10026-22-9	7789-02-8	1-00-72001	10000-60-1	13597-99-4	10022-31-8	7440-36-2	7440000	7440-36-0	7784-27-2
1 mg/m3	cm/gm co.o	0.05	5 ma/m3	10 ug/m3	0.2 mg/m3	1 mg/m3	5 mg/m3	0.05 mg/m3	5 mg/m3	CHI/Ann	malma	0.02 mg/m3	0.5 mg(Cr)/m3	con mg/ma	004	0.2ua/m3	0.5 mg/m3	U.U1 mg/m3	Calligation	O S malma	2 mg/m3
orl-rat 1190mg/kg	orl-rat 58.1mg/kg	Rushin oo oo mino	orl-rat 6700 molto	N.	orl-rat 68 mo/kg	orf-rat 1620 mg/kg	orl-rat >300mg/kg	intryns-rat 93 mg/kg	orl-rat 7500mg/kg	on-rat /84 mg/kg	B. C.	ori-rat 691 mo/ko	orl-rat 3250 mg/kg	ori-rat 60.2mg/kg	Aufferior of the Control	infryns-rat 3 16ma/sa	orl-rat 355 mg/kg	orl-rat 763 mg/kg	Bydu oppy means	Buffin 1 100 min	orl-rat 3671 modes
3168	3165			3151	-	- 1	3132	3128	3126a	3114		-	3112a	3108	П	- 1	3104a	3103a	31028	1	21015

Certified Reference Material CRM

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

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

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Physical Characterization:

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

3 of 3

^{*} 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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M5768 [M576] (B) R:1/3/24 Certified Reference Material CRM



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

CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 марозгозат Compound Nominal Concentration (µg/mL): m/z-> ~-z/m m/z-> Weight shown below was diluted to (mL): Recommended Storage: 2.0≡4 1.0E4 5.0E5 1.0E6 1000 2000 NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 쭕 **BTU9** 58112 091823 10000 Ambient (20°C) (M5+18), (M5+16) 091826 Magnesium (Mg) Number 120 ğ 20 [19.923 sec]:58112.D# [Count] [Linear] Conc. (µg/mL) 2000.02 0.058 Flask Uncertainty 10000 Nominal 130 230 30 5E-05 Balance Uncertainty 99.999 Purity Uncertainty Assay 8 Purity (%) (%) 140 0.10 240 40 Solvent: 24002546 Nitric Acid 8.51 150 234.9118 Weight (g) Target Lot # Ē Weight (g) Conc. (µg/mL) 234.9126 Nitric Acid Actual 160 260 0 10000.0 Actual 170 6 +/- (µg/mL) Expanded Uncertainty Reviewed By: Formulated By: 20.0 180 80 13446-18-9 (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 Pedro L. Rentas Lawrence Barry 190 **SDS Information** Ö Z 200 100 orl-rat 5440 mg/kg 3131a 091823 091823 SRM

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

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

	[171	<u></u>	(22)	5>	Sb	5>			
	۴	. 22.	<u>ਨੰ</u>	<u>a</u>	- 2	<u> </u>				
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	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
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	Ti	Sn	Im	Th	Ħ	Te	σľ.			
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	<0.02	40.02	<0.02	<0.02	A).02	40.02	40.02			

(T) = Target analyte

Physical Characterization:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * 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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M5768 [M576] (B) R:1/3/24 Certified Reference Material CRM



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

CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 марозгозат Compound Nominal Concentration (µg/mL): m/z-> ~-z/m m/z-> Weight shown below was diluted to (mL): Recommended Storage: 2.0≡4 1.0E4 5.0E5 1.0E6 1000 2000 NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 쭕 **BTU9** 58112 091823 10000 Ambient (20°C) (M5+18), (M5+16) 091826 Magnesium (Mg) Number 120 ğ 20 [19.923 sec]:58112.D# [Count] [Linear] Conc. (µg/mL) 2000.02 0.058 Flask Uncertainty 10000 Nominal 130 230 30 5E-05 Balance Uncertainty 99.999 Purity Uncertainty Assay 8 Purity (%) (%) 140 0.10 240 40 Solvent: 24002546 Nitric Acid 8.51 150 234.9118 Weight (g) Target Lot # Ē Weight (g) Conc. (µg/mL) 234.9126 Nitric Acid Actual 160 260 0 10000.0 Actual 170 6 +/- (µg/mL) Expanded Uncertainty Reviewed By: Formulated By: 20.0 180 80 13446-18-9 (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 Pedro L. Rentas Lawrence Barry 190 **SDS Information** Ö Z 200 100 orl-rat 5440 mg/kg 3131a 091823 091823 SRM

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

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

	[171	<u> </u>	(22)	5>	Sb	5>			
	۴	. 22.	<u>ਨੰ</u>	<u>a</u>	- 2	<u> </u>				
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	7	La	Fe	F	Б	Но	出			
	<0.02	40.02	40.2	△0.02	<0.02	<0.02	<0.02		Trace Mo	
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	×	면	7	Pd	õ	\$	Z		tion	
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	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		g/mL)	
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	<0.02	40.02	<0.02	<0.2	<0.02	<0.02	40.2			
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	<0.02	40.02	<0.02	<0.02	A).02	40.02	40.02			

(T) = Target analyte

Physical Characterization:

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

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



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

CERTIFIED WEIGHT REPORT: Part Number: 57004 102523 02/09/24 Lot # Solvent:

24002546 Nitric Acid

2.0% (IE)

Nominal Concentration (µg/mL):

NIST Test Number:

BTU₉ 1000

Volume shown below was diluted to (mL):

2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Recommended Storage:

Ambient (20 °C) 102526

Expiration Date:

Lot Number: Description:

Beryllium (Be)

40.0

Nitric Acid

Benson Chan

102523

Formulated By:

Reviewed By:

Pedro L. Rentas 102523

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





800-368-1131



Certified Reference Material CRM

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

							Trace M	etals	Verificat	cation	by ICP-M	(J) S	ua/mL)						
	TATES AND AND		District Color	STATE OF THE PERSON		Senter and		SOMETHINGS.	NAME OF STREET	SAMOOGE STATE	SECOND SPINSO	None and a	. 18						
F	<0.02	3	<0.02	Ďλ	<0.02	HL	<0.02	Li	<0.02	z	<0.02	Ā	<0.02	Se	<0.2	T.	<0.02	M	<0.02
Sp	<0.02	ථ	40.2	占	₹0.02	He	<0.02	3	<0.02	£	<0.02	Re	<0.02	Š	<0.02	ę	₹0.02	Þ	<0.02
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Ba	<0.02	ర	<0.02	3	<0.02	ㅂ	<0.02	Mn	<0.02	2	<0.02	8	<0.02	ž	40.2	Ħ	<0.02	2	<0.02
æ	Т	Ö	40.02	ő	40.02	£	<0.7	Hg	<02	Δ,	<0.02	Ru	<0.02	š	<0.02	Tm	₹0.02	×	40.02
洒	<0.02	රි	<0.02	ප	<0.02	ឌ	40.02	Mo	<0.02	武	40.02	Sm	<0.02	S	<0.02	S	<0.02	2	<0.02
æ	<0.02	ರೆ	<0.02	Au	<0.02	£	₹0.02	PK	<0.02	M	<0.2	S	40.02	Ta	<0.02	F	<0.02	Z	40.02

(T) = Target analyte

Physical Characterization:

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

Certified by:



All standard containers are meticulously cleaned prior to use.

2 of 2

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

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122



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

CERTIFIED WEIGHT REPORT:

Part Number: Description: Lot Number: 57050 071123 Tin (Sn)

Salvents: 21110221

Nitric Acid Hydrochloric acid

Lot #

22D0562008

Nominal Concentration (µg/mL): Recommended Storage: **NIST Test Number:** Expiration Date: 1000 Ambient (20 °C) 071126

Weight shown below was diluted to (mL): **BTU9** 499.93

RM#

Number

Conc. (µg/mL) Nominal

(%)

Uncertainty Assay
Purity (%) (%)

Weight (g)

Target

ρţ

0.058 Flask Uncertainty 5E-05 Balance Uncertainty

> 10.0 30.0

3 6%

Nitric Acid

Formulated By:

Benson Chan

071123

Hydrochloric acid

Reviewed By:

Pedro L. Rentas

071123

Weight (g)	ACTUAL	
Conc. (µg/ml.)	Actual Ur	
'- (µg/mL)	certainty	xpanded
CAS# OSHA PEL (TWA) LD50	(Solvent Safety	SUS
PEL (TWA)	y Info. On Attache	Information
LD50	d pg.)	
SRM	TSIN	

1. Ammonium hexafluorostannate(IV) (Sn) m/z-> ---X/m --Z/111 2.5E4 5.0E4 1.0ES 2.0E6 2.5E5 S.OEG [1] Spectrum No.1 210 110 0 IN010 SND042023A1 120 220 N [15.034 sec]:58150.D# [Count] [Linear] 1000 230 130 8 240 140 0.10 40 44.2 250 150 Ö 1.13107 1.13286 160 260 60 1001.6 170 70 2.0 180 80 16919-24-7 190 90 7 mg/m3 200 100 ₹ 3161a

Part # 57050



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

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

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(I) = larget analyte

Physical Characterization:

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

Certified by:

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Certified Reference Material CRM

R: 02109124





ANAB ISO 17034 Accredited AR-1539 Certificate Number https:///Absolutestandards.com 091923 091923 (Solvent Safety Info On Attach SDS Information Pedro L. Rentas Lawrence Barry Formulated By: Reviewed By: Expanded Nitric Acid Final Nitric Acid 40.0 (III) hital 24002546 2.0% Nominal Balance Uncertainty Flask Uncertainty 5E-05 0.058 Initial 2000.02 Dilution Ambient (20 °C) Cobalt (Co) Volume shown below was diluted to (mL): 57027 091923 091926 ĕ 1000 **6UTB** Part Description: **Expiration Date:** Recommended Storage: Nominal Concentration (ug/mL): NIST Test Number: Part Number: Lot Number: CERTIFIED WEIGHT REPORT:

						TANK BURNE	10000	CHICAGO CONTROL CONTRO	URCH LABILLY	ianioc)	(Solvent Safety Into, On Attached pg.)	rttached pg.)	202
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL) C	conc. (ug/ml.)	Conc. (µg/mL)	Conc. (ug/ml.)	+/- (ng/mL)	CAS#	Number Number Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA)	1050	SRM
Cobatt(II) nitrate hexahydrate (Co) 58127 050923 0.1000 200.0	58127	050923	0.1000		0.084	1000	10000	100001 100001	9.0	10008.000	000	700	- 5
							20000		7:5	100c0-22-9	O.UZ ING/ITI3	STEE 10020-22-9 0.02 mg/ms on-rat 691 mg/kg 3113	3113
2000	Z Ezz	1.0	9 4 DAG 45	Cau. Co	CHARLE WAS	[1] Specifical No.1 Cat. 04.04% pool: nacotation of the partition of the p							

1.0E6	5.0E5	m/z->	5.0E7	1.0E8	5.0E7
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		.09		150	
		. O		160	
				170	
		02			
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		100		200	

Lot # 091923

250

240

230

220

010

W/Z->

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):

							Trace M	etals	Verifical	tion	by ICP-M	4S (F	ig/mL)						
1							STREET, STREET	No section lives	ALL DESCRIPTION OF THE PERSON	10.000	Market Mark	MINNSH.	San Salar Salar	NAME OF TAXABLE PARTY.	Service of the last	SECOND STATES		THE PERSON NAMED IN	STREET, SQUARE,
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遥	40.02	රි	۳	Ğ,	4002	ដ	<0.02	Mo	40.02	Æ	20'0 >	S	<0.02	S	40.02	Sn	40.02	Zn	Ø.02
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(T)= Target analyte

Physical Characterization:

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



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Lot # 091923

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02/00/24 Certified Reference Material CRM

W 580



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

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: Expiration Date: Part Number: Description: Lot Number: 57033 111323 Arsenic (As) **BTUB** 1000 111326 Ambient (20 °C) 5E-05 Balance Uncertainty 24002546 Lot# 2.0% Nitric Acid Solvent: 80.0 Nitric Acid Formulated By: Reviewed By: Therence Pedro L. Rentas Lawrence Barry

1. Arsenic (As)

58133

020522

0.1000

400.0

0.084

1000

10001.0

1000.0

2.0

7440-38-2

0.5 mg/m3

orl-rat 500 mg/kg 3103a

Number Part

Number Lot

Vol. (mL)

Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/ml.) Uncertainty Expanded

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

LD50

NIST SRM

SDS Information

111323

111323

Dilution Factor

initial

Uncertainty

Nominal

Initial

Final

Compound

Volume shown below was diluted to (mL):

4000.0

0.06

Flask Uncertainty

-z/x->	500	m/z->	N IN IN	m/z-> 5.0≣4	1.0厘5	≥.005
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240		140		ò		33.D#
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		180		80		
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Part # 57033

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Target analyte	40.02 40.02 40.02 40.02	by ICP-N	
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Physical Characterization:

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

Certified by:



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Certified Reference Material CRM

R102109124

MURIC

Solvent: 21110221

Nitric Acid

Lot #

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

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:**

57115 041723

Description:

Phosphorous (P)

Expiration Date:

041726

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

BTUB

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02

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

1. Ammonium dihydrogen phosphate (P)

IN008 PV082019A1

10000

99,999

0.10

27.5

RM#

Compound

22%

40.0

Nitric Acid

Formulated By:

Lawrence Barry

041723

into

Reviewed By:

Pedro L. Rentas

Expanded SDS Information 041723

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

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

Part # 57115

1 of 2

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(I)= larget analyte

Physical Characterization:

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

Certified by:

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2 of 2

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Certified Reference Material CRM

109/24

M5817

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

CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: 071123 57116

Solvent:

071123

ASTM Type 1 Water

Burense

Formulated By:

Lawrence Barry

071123

Lot #

Expiration Date: Description: 071126 Sulfur (S)

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

Recommended Storage:

EU1B

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

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

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

Expanded

071123

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

m/z->	1.005	m/z-> 2.0E5	2.5E5	5.0E5	1000	2000
0		110		0		
N N O		120		20		
230		130		3 0		
24		140		40		
250		150		50		
260		190		8		
		170		70		
		180		8.		
		190		90		
		200		100		

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	Li Li Mg Mn Hg
(T)= Tarnet analyte	Verifica
onak.	K P P B S S N
5	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
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	(µg/mL)
	Ta Sr Na Se
	40.22 40.02 40.02 40.02 40.02 7 7 40.02
	To T
	60000000000000000000000000000000000000
	Z
	666666666666666666666666666666666666666

Physical Characterization:

(1)= larger analyte

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

Certified by:

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Certified Reference Material CRM

109/24

Solvent: 24002546 Nitric Acid

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

CERTIFIED WEIGHT REPORT: M.5818

Part Number: Lot Number: Description: 57014 122023 Silicon (SI)

Expiration Date: 122026

2%

Nitric Acid

Formulated By:

Aleah O'Brady

122023

Areah o Brasky

Reviewed By:

Pedro L. Rentas

122023

SRM

Œ. 40.0

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: **BTU9** 1000 Ambient (20 °C)

Weight shown below was diluted to (mL): 1999.48 5E-05 Balance Uncertainty

0.058 Flask Uncertainty

	11 -
Ammonium hexafluorosilicate (Si)	Compound
10009 :	RM#
SID082022A1	Lot
IN009 SID082022A1 1000 99.999 0.10 14.4 13.8854 13.8855	Lot Nominal Purity Uncertainty Assay Number Conc. (µg/mL) (%) Purity (%) (%) W
99.999	Purity (%)
0.10	Uncertainty Purity (%)
14.4	Assay (%)
13.8854	Target Weight (g)
13.8855	Actual Weight (g)
1000.0	Actual Conc. (µg/mL)
2.0	Expanded Uncertainty +/- (µg/mL)
16919-19-0	(Solven
1000.0 2.0 16919-19-0 2.5 mg/m3	Expanded SDS Information Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50
orl-mus 70 mg/kg	on Attached pg.)

m/z->	5.0E5	m/z->	1.026	m/z->	2500	\$1 0 0
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Part # 57014

Lot # 122023



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(T) = Target analyte

Physical Characterization:

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

Certified by:

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

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

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



Certified Reference Material CRM

2 02/na

ング

Solvent: 24002546

Nitric Acid

F Lot #

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

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: 58030

Description:

111623 Zinc (Zn)

Ambient (20 °C) 111626

Expiration Date:

Nominal Concentration (µg/mL): Recommended Storage:

NIST Test Number:

BTU9 1000

5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Weight shown below was diluted to (mL):

3000.4

5

Nominal

Purity

Uncertainty Assay

Target

Actual

Actual

Uncertainty

Expanded

<u>%</u> 60.0 <u>a</u>

Nitric Acid

Formulated By: Benson Chan

111623

Reviewed By: Pedro L. Rentas

111623

Zinc nitrate hexahydrate (Zn) Compound [1] Spectrum No.1 [31.103 sec]:58130.D# [Count] [Linear] IN016 ZNE032021A1 RM# Number Conc. (µg/ml.) 1 000 99.999 8 Purity (%) 0.10 24.3 3 Weight (g) 12.3475 Weight (g) Conc. (µg/ml.) 12.3502 1000.2 +/- (µg/mL) 2.0 10196-18-6 CAS# OSHA PEL (TWA) orl-rat 1190mg/kg 3168



(Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 **SDS** Information SRM SRM

200

100

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(I) = larget analyte

Physical Characterization:

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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).

	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

R: 03/16/23 MS473 MS474, MS475, MS Lot #

CERTIFIED WEIGHT REPORT:

Part Number:

56138 082922

Solvent: 20510011

Nitric Acid

2% 20.0 Nitric Acid

<u>P</u>

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 10000 Recommended Storage:

Ambient (20 °C) 082925

Expiration Date:

Description: Lot Number:

Strontium (Sr)

Weight shown below was diluted to (mL):

1000.12

0.058 Flask Uncertainty 5E-05 Balance Uncertainty

> Formulated By: Lawrence Barry

Pedro L. Rentas

Reviewed By:

082922

082922

OSHA PEL (TWA)

SRM SRM

CAS#

SDS Information (Solvent Safety Info. On Attached pg.) Ι₹ orl-rat >2000mg/kg 3153a LD50

2.5 € 6 5.0E6 [1] Spectrum No.1 [14.495 sec]:58138.D# [Count] [Linear] Strontium nitrate (Sr

IN017 SRZ022018A1

10000

99.997

0.10

41.2

24.2756 Weight (g)

24.2758

10000.1

20.0

10042-76-9

RM#

Number

Conc. (µg/mL)

8

Purity (%)

8

Weight (g) Conc. (µg/mL) +/- (µg/mL)

Uncertainty

Expanded

닭

Nominal

Purity Uncertainty Assay

5.0E5 1.0E6

M/z->

10

20

30

40

50

60

0

80

90

100

m/z-> 5.0E6

110

120

130

140

150

160

170

190

200

2.5E6

m/z->

210

220

230

240

250

260

Lot # 082922

Part # 56138

1 of 2

Printed: 9/21/2022, 11:20:01 PM

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

П				П		Ш	Trace Me	tals	Verifica	tion	by ICP-	MS	(µg/mL)	П					
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As	<0.2	င္စ	<0.02	땹	<0.02	F	<0.02	Mg	<0.01	ွ	<0.02	R.	△ 0.02	Ag	<0.02	∄	<0.02	<	<0.02
Ba	<0.02	ဂ္ဂ	<0.02	ନ୍ଦ	<0.02	ī	<0.02	M	<0.02	Pd	△ 0.02	RЪ	<0.02	N ₂	<0.2	∄	<0.02	4,4	<0.02
Be	<0.01	τ	40.02	ନ୍ଥ	<0.02	뜐	<0.2	Нg	<0.2	Ъ	<0.02	Ru	<0.02	S.	Т	Tm	<0.02	~	<0.02
Bi	0.02	င္ပ	<0.02	ဌာ	<0.02	La	<0.02	Μo	<0.02	뫈	<0.02	Sm	<0.02	S	△ 0.02	S	<0.02	Zn	<0.02
В	<0.02	5	<0.02	Au	<0.02	Рь	<0.02	Nd	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Zr	<0.02

Physical Characterization:

(T)= Target analyte

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