

8900, Fax: 908 789 8922

Prep Standard - Chemical Standard Summary

Order ID: P4917

Test: Metals CLP MS, Metals CLP MS FULL

Prepbatch ID: PB165237,PB165238,

Sequence ID/Qc Batch ID: LB133719,LB133719,

Standard ID:

MP82128, MP83014, MP83016, MP83032, MP83033, MP83034, MP83035, MP83036, MP83037, MP83038, MP83039, MP83042, MP83042, MP83043, MP83044, MP83045, MP83046, MP83048, MP83049, MP83050, MP83105, MP83122, MP83049, M

Chemical ID:

M5192,M5288,M5289,M5294,M5304,M5390,M5476,M5497,M5498,M5513,M5515,M5519,M5658,M5698,M5739,M5751,M5769,M5798,M5799,M5800,M5801,M5802,M5806,M5815,M5816,M5817,M5818,M5819,M5820,M5873,M5874,M5961,M5962,M5976,M5978,M5981,M5982,M5983,M6021,M6023,M6025,M6028,M6030,M6033,M6040,M6055,M6095,M6111,M6115,M6116,W3112,





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
641	1:4 HCL	MP82128	09/03/2024	02/08/2025	Janvi Patel	None	None	,
								09/03/2024

FROM 1500.00000ml of W3112 + 500.00000ml of M6040 = Final Quantity: 2000.000 ml

Recipe ID	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Mohan Bera
1122	ICPMS CALIB BLANK(S0/ICB/CCB)	MP83014	11/02/2024	12/06/2024	Sarabjit Jaswal	None	None	11/04/2024

FROM 25.00000ml of M6095 + 4925.00000ml of W3112 + 50.00000ml of M6115 = Final Quantity: 5000.000 ml



Fax: 908 789 8922

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
2902	S8 ICPMS	MP83016	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

1.00000ml of M6033 + 2.50000ml of M5288 + 2.50000ml of M5515 + 5.00000ml of M5498 + 5.00000ml of M5806 + 79.0000ml of MP83014 = Final Quantity: 100.000 ml

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>	Mohan Bera
3947	S7(SFAM,6020,200.8)	MP83032	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

0.40000 ml of M5513 + 1.00000 ml of M5799 + 1.00000 ml of M5818 + 1.00000 ml of M5981 + 1.00000 ml of M5983 + 1.90000 ml of M6033 + 10.00000 ml of M6115 + 2.00000 ml of M5815 + 2.00000 ml of M5817 + 2.50000 ml of M5476 + 4.00000 ml of M5390 + 4.90000 ml of M5515 + 4.90000 ml of M5519 + 5.00000 ml of M6095 + 50.00000 ml of M5304 + 832.80000 ml of M5498 + 9.00000 ml of M5519 + 9.00000 ml of M5576 + 9.00000 ml of M5578 + 9.90000 ml of M5751 + 9.90000 ml of M5769 + 9.90000 ml of M5806 = Final Quantity: 1000.000 ml



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

Fax: 908 789 8922

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
3948	S6(SFAM,6020,200.8)	MP83033	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM	0.50000ml of M6095 + 1.00000ml of M61	15 + 48.50000ml of W3112 + 50.00000ml of MP83032 = Final Quantity: 100.000 m	d
------	---------------------------------------	--	---

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
3954	S4(SFAM,6020,200.8)	MP83034	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 0.50000ml of M6095 + 1.00000ml of M6115 + 86.00000ml of W3112 + 12.50000ml of MP83032 = Final Quantity: 100.000 ml





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
3949	S5(SFAM,6020,200.8)	MP83035	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 0.50000ml of M6095 + 1.00000ml of M6115 + 73.50000ml of W3112 + 25.00000ml of MP83032 = Final Quantity: 100.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3951	S3(SFAM, 6020,200.8)	MP83036	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 0.50000ml of M6095 + 1.00000ml of M6115 + 88.50000ml of W3112 + 10.00000ml of MP83033 = Final Quantity: 100.000 ml



Fax: 908 789 8922

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
3955	S2CONC(SFAM,6020,200.8)	MP83037	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

0.05000 ml of M5698 + 0.05000 ml of M5798 + 0.05000 ml of M5800 + 0.05000 ml of M5801 + 0.05000 ml of M5961 + 0.05000 ml of M5981 + 0.05000 ml of M5982 + 0.05000 ml of M5983 + 0.05000 ml of M6023 + 0.05000 ml of M6025 + 0.05000 ml of M6028 + 0.05000 ml of M6030 + 0.10000 ml of M5658 + 0.10000 ml of M5751 + 0.10000 ml of M5802 + 0.10000 ml of M6033 + 0.25000 ml of M5515 + 0.25000 ml of M5799 + 0.25000 ml of M5819 + 0.25000 ml of M5962 + 0.25000 ml of M5976 + 0.25000 ml of M5976 + 0.25000 ml of M5818 + 1.25000 ml of M5815 + 1.25000 ml of M5817 + 2.50000 ml of M5498 + 2.50000 ml of M5519 + 2.50000 ml of M5769 + 2.50000 ml of M5806 + 2.50000 ml of M6015 = Final Quantity: 250.000 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
3956	S2(SFAM,6020,200.8)	MP83038	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 0.50000ml of M6095 + 1.00000ml of M6115 + 88.50000ml of W3112 + 0.50000ml of MP83037 = Final Quantity: 100.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Mohan Bera
3957	S1(SFAM,6020,200.8)	MP83039	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	

FROM	0.50000ml of M6095 + 1.0	0000ml of M6115 +	88.50000ml of W3112 +	10.00000ml of MP83038	= Final Quantity: 100.000 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>	Mohan Bera
3958	ICV(SFAM)	MP83041	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 2.00000ml of M5294 + 98.00000ml of MP83014 = Final Quantity: 100.000 ml



Fax: 908 789 8922

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
3961	ccv	MP83042	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

0.20000 ml of M5513 + 0.50000 ml of M5799 + 0.50000 ml of M5818 + 0.50000 ml of M5981 + 0.50000 ml of M5983 + 1.00000 ml of M5815 + 1.00000 ml of M5817 + 1.25000 ml of M5476 + 10.00000 ml of M6115 + 12.45000 ml of M5515 + 12.45000 ml of M5519 + 2.00000 ml of M5390 + 24.95000 ml of M5498 + 24.95000 ml of M5769 + 24.95000 ml of M5806 + 25.00000 ml of M5598 + 4.50000 ml of M5598 + 4.50000 ml of M5976 + 4.50000 ml of M5978 + 5.00000 ml of M6095 + 823.45000 ml of W3112 = Final Quantity: 1000.000 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
1142	ICSA ICPMS	MP83043	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 10.00000ml of M5873 + 90.00000ml of MP83014 = Final Quantity: 100.000 ml



Fax: 908 789 8922

Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Mohan Bera
1143	ICSAB ICPMS	MP83044	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	

FROM 10.00000ml of M5873 + 10.00000ml of M5874 + 80.00000ml of MP83014 = Final Quantity: 100.000 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
3963	CONC.LCSW SPIKE	MP83045	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

0.25000 ml of M5698 + 0.25000 ml of M5798 + 0.25000 ml of M5800 + 0.25000 ml of M5801 + 0.25000 ml of M5961 + 0.25000 ml of M5962 + 0.25000 ml of M5983 + 0.25000 ml of M6023 + 0.25000 ml of M6025 + 0.25000 ml of M6028 + 0.25000 ml of M6030 + 0.50000 ml of M5289 + 0.50000 ml of M5658 + 0.50000 ml of M5751 + 0.50000 ml of M5802 + 1.25000 ml of M5192 + 1.250000 ml of M5799 + 1.250000 ml of M5819 + 1.25000 ml of M5962 + 1.25000 ml of M5497 + 12.50000 ml of M5769 + 12.50000 ml of M5806 + 12.52000 ml of M5519 + 156.23000 ml of M3112 + 2.50000 ml of M5390 + 2.50000 ml of M5818 + 5.00000 ml of M5515 + 5.00000 ml of M6095 + 5.00000 ml of M6115 + 6.25000 ml of M5816 + 6.25000 ml of M5820 = Final Quantity: 250.000



Fax: 908 789 8922

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
3964	CONC.LCSS SPIKE	MP83046	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM

0.25000 ml of M5698 + 0.25000 ml of M5798 + 0.25000 ml of M5800 + 0.25000 ml of M5801 + 0.25000 ml of M5961 + 0.25000 ml of M5961 + 0.25000 ml of M5961 + 0.25000 ml of M5982 + 0.25000 ml of M5983 + 0.25000 ml of M6023 + 0.25000 ml of M6025 + 0.25000 ml of M6025 + 0.25000 ml of M6030 + 0.50000 ml of M5289 + 0.50000 ml of M5658 + 0.50000 ml of M5751 + 0.50000 ml of M5802 + 1.25000 ml of M5799 + 1.25000 ml of M5819 + 1.25000 ml of M5962 + 1.25000 ml of M6021 + 12.50000 ml of M5769 + 12.50000 ml of M5806 + 12.52000 ml of M5519 + 156.23000 ml of M3112 + 2.50000 ml of M5390 + 2.50000 ml of M5818 + 5.00000 ml of M5515 + 5.00000 ml of M6095 + 5.00000 ml of M6115 + 6.25000 ml of M5816 + 6.25000 ml

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>	Mohan Bera
3962	MG 10PPM FOR TUNE	MP83048	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 0.01000ml of M5769 + 9.99000ml of MP83014 = Final Quantity: 100.000 ml





Fax: 908 789 8922

Metals STANDARD PREPARATION LOG

ID NAME NO. Prep Date Date By Scal	
ID NAME NO. Prep Date By Scal	PID PipettelD Mohan Bera
3894 TUNE 200PPB MP83049 11/02/2024 12/06/2024 Sarabjit Jaswal No	- I
	ETTE_3 (A) 11/04/2024

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
3903	ISS 3PPM	MP83050	11/02/2024	12/06/2024	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	11/04/2024

FROM 5.00000ml of M6115 + 75.00000ml of M5739 + 30.00000ml of MP83014 = Final Quantity: 100.000 ml





Fax: 908 789 8922

Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
170	1:1HCL	MP83105	11/07/2024	12/06/2024	Janvi Patel	None	None	,
								11/07/2024

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
169	1:1HNO3	MP83122	11/07/2024	12/06/2024	Janvi Patel	None	None	11/07/2024

FROM 1000.00000ml of M6116 + 1000.00000ml of W3112 = Final Quantity: 2000.000 ml



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57042 / Mo, 1000 PPM, 125 ml	051722	05/17/2025	07/01/2022 / bin	06/17/2022 / jaswal	M5192
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
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 (AI) 10,000PPM	070622	07/06/2025	09/02/2022 / jaswal	07/12/2022 / jaswal	M5289
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	01/01/2025	12/13/2023 / bin	02/20/2020 / bin	M5294
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020CAL-1 / Calibration Standard Method 6020	S2-MEB711244	10/20/2026	08/07/2024 / jaswal	04/01/2022 / jaswal	M5304
				<u> </u>		
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57138 / Sr, 10000 PPM, 125 ml	082922	08/09/2025	07/29/2024 / jaswal	03/16/2023 / jaswal	M5476
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	031523	03/15/2026	03/18/2023 / bin	03/17/2023 / bin	M5497
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	031523	03/15/2026	08/15/2023 / jaswal	03/17/2023 / bin	M5498
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 /	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	092122	09/21/2025	08/01/2024 / Jaswal	03/17/2023 / bin	M5515
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute	57119 / Potassium (K) 10,000PPM	120822	12/08/2025	01/08/2024 / bin	03/17/2023 / bin	M5519



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.	58025 / Mn, 1000 PPM, 500 ml	102623	10/26/2026	04/18/2024 / jaswal	10/27/2023 / jaswal	M5698
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020ISS / 6020ISS, 10 ug/ml, Bi, Ho, In, 6Li, Rh, Sc, TB, Y	T2-MEB709511	09/03/2026	08/07/2024 / jaswal	04/11/2022 / jaswal	M5739
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	071723	07/17/2026	10/01/2024 / Jaswal	08/25/2023 / jaswal	M5751
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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	57004 / Be, 1000 PPM,	102523	10/25/2026	02/09/2024 /	02/09/2024 /	M5798



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57050 / Sn, 1000 PPM, 125 ml	071123	07/11/2026	02/09/2024 / bin	02/09/2024 / bin	M5799
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	120523	12/05/2026	08/07/2024 / jaswal	01/03/2024 / jaswal	M5802
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	122223	12/22/2026	08/01/2024 / Jaswal	01/03/2024 / jaswal	M5806
			-	•	•	•
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57016 / S, 1000 PPM, 125 ml	122923	12/29/2026	05/20/2024 / Jaswal	02/09/2024 / jaswal	M5816
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 / jaswal	02/09/2024 / jaswal	M5818
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58030 / Zinc, Zn, 500 ml, 1000 PPM	111623	11/16/2026	03/20/2024 / jaswal	02/09/2024 / jaswal	M5819
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
EPA	PART A / ICSA (ICPMS) STOCK SOLN	CP-MS ICSA-0803		04/17/2024 / jaswal	07/14/2022 / jaswal	M5873



Fax: 908 789 8922

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSB (ICPMS) STOCK SOLUTION	CP-MS ICSB-0803	04/30/2025	04/17/2024 / jaswal	07/14/2022 / jaswal	M5874
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57028 / Ni, 1000 PPM, 125 ml	041124	04/11/2027	07/02/2024 / Jaswal	06/11/2024 / Jaswal	M5961
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGMO1-1 / MOLYBDENUM 125mL 1000ug/mL	T2-MO720876	07/17/2027	08/07/2024 / jaswal	02/22/2024 / Jaswal	M5976
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	06/17/2027	08/07/2024 / jaswal	02/22/2024 / Jaswal	M5978
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57092 / U, 1000 PPM, 125	060724	06/07/2027	07/29/2024 / Jaswal	06/11/2024 / Jaswal	M5981



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	031524	03/15/2027	07/01/2024 / Jaswal	06/11/2024 / Jaswal	M5982
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57040 / Zr, 1000 PPM, 125 ml	071423	07/14/2026	07/29/2024 / Jaswal	06/11/2024 / Jaswal	M5983
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier Absolute Standards, Inc.	ItemCode / ItemName 57082 / Pb, 1000 PPM, 125 ml	Lot # 061224	I -	-		
Absolute	57082 / Pb, 1000 PPM,		Date	Opened By 08/05/2024 /	Received By 08/05/2024 /	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / Al, 10000 PPM, 500 ml	011623	01/16/2026	08/07/2024 / Jaswal	01/03/2024 / Jaswal	M6033
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	24D1562005	02/08/2025	08/09/2024 / jaswal	08/01/2024 / Janvi	M6040
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	IV-STOCK-12 / ICP-MS TUNING SOLUTION, 125mL	U2-MEB734294	06/21/2028	08/21/2024 / Jaswal	08/19/2024 / Jaswal	M6055
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)		03/17/2029	10/26/2024 / Janvi	10/21/2024 / Janvi	M6095
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



Fax: 908 789 8922

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24B1362001	05/04/2025	11/02/2024 / Janvi	09/29/2024 / Eman	M6115

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24B1362001	05/03/2025	11/04/2024 / Janvi	09/29/2024 / Eman	M6116

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

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

R 815/24

Solvent:

24002546

Nitric Acid

Lot #

M6028

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

CERTIFIED WEIGHT REPORT:

Part Number:

57048 070124

Lot Number: Description:

Cadmium (Cd)

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB

1000

Recommended Storage:

Expiration Date:

070127 Ambient (20 °C)

Weight shown below was dliuted to (mL):

2000.07

0.100 Flask Uncertainty 5E-05 Balance Uncertainty

2%

40.0 (mL) Nitric Acid

Formulated By:

Alban PROBAN

Aleah O'Brady

070124

Reviewed By:

Pedro L. Rentas

070124

Expanded

Weight (g) Conc. (µg/mL) Uncertainty

Cadmium nitrate tetrahydrate (Cd)

IN024 CDM092021A1

1000

99.999

0.10

36.5

5.4797

5.4804

1000.1

2.0

10022-68-1

0.01 mg/m3

orl-rat 60.2mg/kg

3108

RM#

Number Lot

Conc. (µg/mL)

8

8

Weight (g)

Target

Actual

Actual

Nominal

Purity

Uncertainty Assay Purity (%)

+/- (µg/mL)

CAS#

SDS Information

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

NIST SRM

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

1 of 2

www.absolutestandards.com

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

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

		₩ !	묤	Ве	ם ל	烎	As	00	2	2			
	10.04	200	A (2)	10.02	0.02	3	8	20.05	3	40.02			
	2	2 8	3	Ţ.	, E	?	င္ပ	2)	2			
	70.02	2 6 6	8	40.02	20.02	3	<u> </u>	9.2	,	7	STATE OF THE STATE		
	- Au	} {	3	G	g	2	달'	ķ	, ,	٧			
	20.02	3 6	3	40.02	20.02	3	8	40.02	20.02	2000	STATISTICS AND A STATISTICS.		
	20	2 5	,	4	ing	• }	3'	Но	111	JH.	S02119	L	
	20.02	20.02	3	∆ 0,2	♦ 0.02		A S	40.02	20.02	200	PHONE SPECIES	race Me	
	20	MIO	5,	He	Mn	ď	≤	Ε.	Ē			Metals	I
(T) = Target analyte	40,02	20.02	5	∆ 0.2	<0.02	10.01	200	40,02	20,02	2000		Verifica	
jet anal	×	7	,	9	Pd	ξ	<u></u>	3	2			tion	
yte	A0.22	\$0.02		A) (2)	40.02	70.02	3	<0.02	20.02	5		by ICP-	
	Sc	Sm	•	2	Rb	2	ğ	R	7			MS (
	40.02	40.02		∆	40,02	20.02	3	40.02	40.02			Jg/mL)	
	Ta	S		ę	Z	700		S.	Š.	,	National Control		ı
	Ð.02	40.02	40.04	3	40.2	20.02	3	A0.02	40.2				
	Ti	Sn	1111	7	7	11	1 ;	7	7				
	<0.02	40.02	20.07	3	∆ 0,02	<0.02		40.02	40.02	The State State of the			
	Zt	Zn		<	¥	<		=	Ø	The second second			
	<0.02	<0.02	20.02	3	<0.02	40.02	20.02	3	40.02	TO STATE OF			

Physical Characterization:

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

Part # 57048

2 of 2

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

R: 8/5/24

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

CERTIFIED WEIGHT REPORT:

Part Number: 57182

Solvent:

24002546

Nitric Acid

Lot#

2%

Nitric Acid

Formulated By:

Lawence Barry

110923

Revenue

1 40.0

Description: Lot Number: 110923 Lead (Pb)

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

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

Weight shown below was diluted to (mL): Cot 2000.02 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target

IN029 PBD122016A1 RW# Number Conc. (µg/mL) 10000 99.999 38 Purity (%) 0.10 62.5 **3** 32.0006 Weight (g) 32.0040 Weight (g) Conc. (µg/mL) 10001.1 20.0 10099-74-8 0.05 mg/m3 intryns-rat 93 mg/kg 3128

Actual Actual

Uncertainty Expanded

Reviewed By:

Pedro L. Rentas

110923

+/- (µg/mL) CAS#

OSHA PEL (TWA) SDS information

OSHA PEL (TWA) LD50 TSIN SRM

 Lead(II) nitrate (Pb) 1.0E7 [1] Spectrum No.1 [17.284 sec]:58182.D# [Count] [Linear]



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

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

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

Physical Characterization:

(T)= Target analyte

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

Sor I Mill

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

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

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

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

M.5192 R: 06/17/2

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

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



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

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

		В	-	D.	Ве	Ва		D 0	Sb	A	-		
		H	-		10.0					-	STATE OF THE PERSON NAMED IN		
		.02	70.	3 :	0	22	1	ว์	8	.02	The second second		
		5	8	,	-	င္ပ	6	,	<u>.</u>	8	The second second		
		40.02	20.02	0.00	3	40.02	20.02	e i	4	<0.02			
		Au	Ç	2	3 -	වු	ᄪ	1 5	Ţ.	Dy			
		A).02	<0.02	20.02	3	<0.02	<0.02	20.02	3	<0.02			
		3	7	7	71 1	='	Б	70	5	斯			
	20102	8	∆ .02	202	5 6	4000	<0.02	20.02	3	40.02		11000	Trace N
		Ž.	Mo	BH.	: 1	\$	Mg	FI	٠,	=		Calo	otolo otolo
(T)=1	20.02	3 ,		402	20.02	3	40.01	40.02	600	A) 00			Varifica
(T)= Target analyte	,	۲ :	¥	'n	2	2	ဝွ	S	1 2	N.		כוסו	±.
nalyte	20.2	2 6 6	3	40.02	20.02	3	40.02	40.02	10.02	A000		DY ICT-INC	20 2
	36	3 5	S S	Ru	KO	2 1	ア	Re	7	P		C	2
	20.02	10.02	3	<0.02	20.02	000	A) (7)	<0.02	20.02	000		9/1111/	~ / / _
	la	٥ ا	2	Sr	Na	. 6	Δα	S:	30	2			
	<0.02	20.02	3	40.02	40.2	20.02	3	40.02	2.6				
	11	No.	,	Ī	H	=	3	E.	10				
	<0.02	20.02		40.02	40.02	20.02	3	<0.02	<0.02				
	72	6	1	~	4,4	<	=	_	*				
	<0.02	<0.02		A000	<0.02	20.02	5	40.02	<0.02				The second secon

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).

3

Certified Reference Material CRM

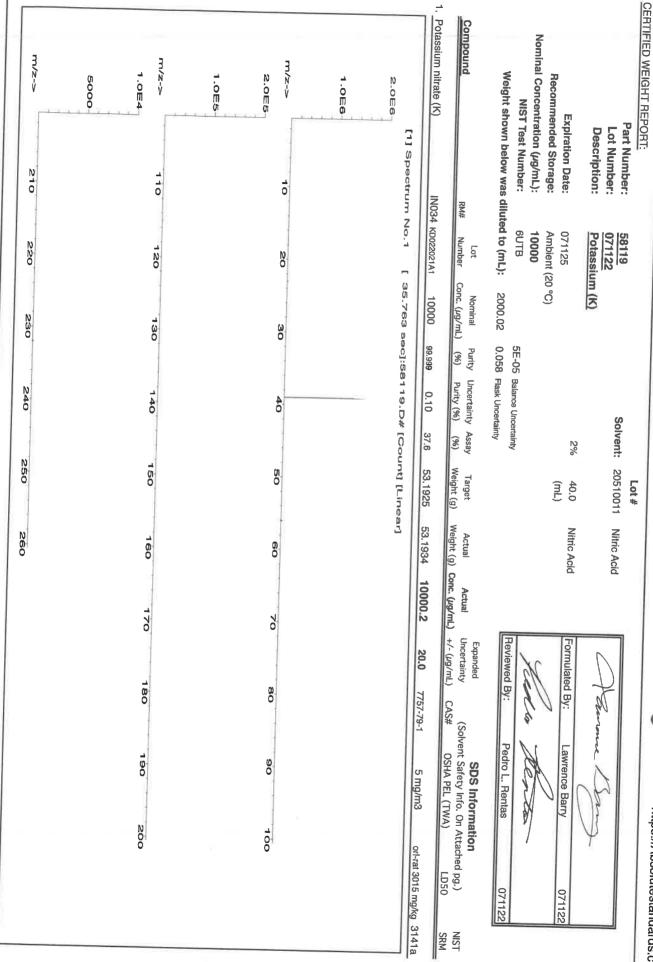
www.absolutestandards.com

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 <0.02 Er As <0.02 Ca <0.02 En Ba <0.02 Cs <0.02 Gd Br <0.02 Gd Br <0.02 Ga Br <0.02 Ga Gd Br <0.02 Ca <0.02 Ga Gd Br <0.02 Ca <0.02 Ga Gd Sb <0.02 Ga	
23 10,002 43	<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 (//g/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.

* 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 # 58119

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



Part # 58113



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

Physical Characterization:

(I)= larger analyte

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

Certified by:

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

2 of 2

Part # 58113



QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program" R: 4120/21

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

These instructions are for advisory purposes only. If any apparent conflict exists between these 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

(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 µg/L (ppb) for the resulting solution(s) after the dilution of the concentrate(s) according to the following instructions. Use Class 'A' glassware to prepare the solution(s).

ICV1-1014

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



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: 6020CAL-1

Lot Number: S2-MEB711244

Matrix: 5% (v/v) HNO3

tr. HF

Value / Analyte(s): 20 µg/mL ea:

Silver, Aluminum, Arsenic, Barium, Beryllium, Calcium, Cadmium, Cobalt, Chromium, Copper, Potassium, Iron, Magnesium, Manganese, Sodium, Nickel, Lead, Antimony, Selenium, Thallium, Zinc Vanadium,

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Aluminum, Al	CERTIFIED VALUE 20.01 ± 0.08 μg/mL	ANALYTE Antimony, Sb	CERTIFIED VALUE 20.01 ± 0.12 μg/mL
Arsenic, As	20.01 ± 0.18 μg/mL	Barium, Ba	20.01 ± 0.11 μg/mL
Beryllium, Be	20.01 ± 0.14 μg/mL	Cadmium, Cd	20.01 ± 0.11 μg/mL
Calcium, Ca	20.01 ± 0.10 μg/mL	Chromium, Cr	20.01 ± 0.16 μg/mL
Cobalt, Co	20.01 ± 0.11 μg/mL	Copper, Cu	20.01 ± 0.10 μg/mL
Iron, Fe	20.01 ± 0.09 μg/mL	Lead, Pb	20.01 ± 0.11 μg/mL
Magnesium, Mg	19.99 ± 0.10 μg/mL	Manganese, Mn	20.01 ± 0.10 μg/mL
Nickel, Ni	20.01 ± 0.11 μg/mL	Potassium, K	20.01 ± 0.10 μg/mL
Selenium, Se	20.02 ± 0.14 μg/mL	Silver, Ag	20.02 ± 0.09 μg/mL
Sodium, Na	20.01 ± 0.10 μg/mL	Thallium, Tl	20.01 ± 0.13 μg/mL
Vanadium, V	20.01 ± 0.11 μg/mL	Zinc, Zn	20.01 ± 0.11 μg/mL

Assay Information:

58	say information:			
	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151 999c	160729
	Ag Al	Volhard		999c 140903
		ICP Assay	3101a	
	Al	EDTA	928	928
	As	ICP Assay	3103a	100818
	Ba	ICP Assay	3104a	140909
	Ba	Gravimetric	2405-	See Sec. 4.2
	Be	ICP Assay	3105a	090514
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Cd	ICP Assay	3108	130116
	Cd	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	Fe	Calculated		See Sec. 4.2
	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
	Pb	ICP Assay	3128	101026
	Pb	EDTA	928	928
	Se	ICP Assay	3149	100901
	Se	Calculated		See Sec. 4.2
	TI	ICP Assay	3158	151215
	TI	Calculated		See Sec. 4.2
	V	ICP Assay	3165	160906
	V	EDTA	928	928
	Zn	ICP Assay	3168a	120629
	Zn	EDTA	928	928

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

Characterization of CRM/RM by Two or More Methods 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

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

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

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

October 20, 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

- October 20, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

 Sealed TCT Bag Open Date: 	
---	--

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

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 Saines

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

Part Number:

57056

Solvent:

20510011

Nitric Acid

8

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):

							Trace M.	otolo	Vorifico	201	F. CO	2						ı	
							1	Cars	۱^		ייין כו	20	ug/mL)						
					The state of the s		The second second											ı	
IA IA	<0.02	ొ	<0.02	δ	<0.02	HF	<0.02	ï	<0.02	Z	<0.02	ď	<0.00	32	6	É	89	1 487	000
Sb	<0.02	ű	<0.5	į.	200	H	70.00	-	200	11.11	000	,		3 ;	1	2	70.02	A	70.05
A	4	,	100	1 1	100	2	70.00	7	20:05	2	Z0:0>	2 2	40.02	2	<0.02	E e	<0.05	Þ	<0.02
AS	7.02	3	Z0:02	3	<0.02	드	<0.02	Ä	0.05	ő	<0.02	Kh.	2002	Αo	2007	F	500	7.7	5
Ha	€	ێ	2002	2	0000	,1		>	200	i			***************************************	Ď	70:05	17	70.02	>	70:05
	٠.	3	*0°0	3	7000	=	70.0>	IMIM	70:0>		<0.02	8	\$0.05 \$0.05	Z	95	É	000	5	500
Be	<0.01	Ü	<0.02	Sa	<0.02	윤	40.2	He	<0.2	۵	2000	Ϋ́	2007	ů	60			; ;	70.00
B.	Q (Q)	2	2002	ď	000	-	600	2	400	. ,	***************************************	1	70'07	วี	70'05	EI T	Z0:02	-	Q.02
i	000	3	- N.O.	3	7000	Š	70'0>	MO	Z0:02	=	<0.02	Sm	40.02	S	<0.02	S	SO 02	72	2007
20	<0.02	ð	<0.02	Au	₹ 0005	P	<0.02	Ž	<0.02	×	<0>	Ž,	2007	5	5	i	9 9	1	70.00
											100	3	70.07	101		_		-	

Physical Characterization:

(T)= Target analyte

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



Certified by:

2 of 2

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

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

^{*} 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.

^{*} 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



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 Lot # 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	io Io Io	by ICP-N	MS ((ng/mL)		ı				
SACTION OF	· · · · · · · · · · · · · · · · · · ·	NOT THE OWNER.	STATE OF THE STATE	1	THE PERSON NAMED IN	STATE OF THE PARTY	1500 NOT 150		THE STATE OF THE S	STATE OF THE PERSON NAMED IN	STATE	0		- Harris	THE REAL PROPERTY OF	THE PARTY OF		Market Market	
Ι¥	<0.02	జ	<0.02	Ą	40.02	Ħ	<0.02	LI	<0.02	Z	<0.02	P.	<0.02	š	<0.2	13	<0.02	≱	<0.02
જ	<0.02	రే	F	占	₹0.02	윒	₹0.02	3	20.02	ź	<0.02	æ	<0.02	ន	<0.02	Je	<0.02	Þ	₹0.02
As	<0.2	පී	₹0.02	超	<0.02	Я	<0.02	Mg	10.0>	ő	<0.02	招	<0.02	Ag	<0.02	F	<0.02	>	<0.02
Ba	<0.02	ඊ	<0.02	3	<0.02	ㅂ	<0.002	Ma	40.02	Z	<0.02	8	<0.02	Z	<0.2	Ę	<0.02	χg	40.02
Be	<0.01	Ö	<0.02	පී	40.02	Ę.	40.2	Hg	<0.2	۵,	<0.02	R	<0.02	ઢ	<0.02	E,	<0.02	7	₹0.02
ã	<0.02	රි	40.02	පි	₹0.02	2	<0.02	Mo	<0.02	盂	<0.02	Sm	<0.02	Ø	₹0.02	Sn	<0.02	2	<0.02
m	<0.02	₫	<0.02	Αŭ	<0.02	£	<0.02	PZ	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Z	40.02

(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

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.

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



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 Lot # 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	io Io Io	by ICP-N	MS ((ng/mL)		ı				
SACTION OF	· · · · · · · · · · · · · · · · · · ·	NOT THE OWNER.	STATE OF THE STATE	1	THE PERSON NAMED IN	STATE OF THE PARTY	1500 NOT 150		THE STATE OF THE S	STATE OF THE PERSON NAMED IN	STATE	0		- Harris	THE REAL PROPERTY OF	THE PARTY OF		Market Market	
Ι¥	<0.02	జ	<0.02	Ą	40.02	Ħ	<0.02	LI	<0.02	Z	<0.02	P.	<0.02	š	<0.2	13	<0.02	≱	<0.02
જ	<0.02	రే	F	占	₹0.02	윒	₹0.02	3	20.02	ź	<0.02	æ	<0.02	ន	<0.02	Je	<0.02	Þ	₹0.02
As	<0.2	පී	₹0.02	超	<0.02	Я	<0.02	Mg	10.0>	ő	<0.02	招	<0.02	Ag	<0.02	F	<0.02	>	<0.02
Ba	<0.02	ඊ	<0.02	3	<0.02	ㅂ	<0.002	Ma	40.02	Z	<0.02	8	<0.02	Z	<0.2	Ę	<0.02	χg	40.02
Be	<0.01	Ö	<0.02	පී	40.02	Ę.	40.2	Hg	<0.2	۵,	<0.02	R	<0.02	ઢ	<0.02	E,	<0.02	7	₹0.02
ã	<0.02	රි	40.02	පි	₹0.02	2	<0.02	Mo	<0.02	盂	<0.02	Sm	<0.02	Ø	₹0.02	Sn	<0.02	2	<0.02
m	<0.02	₫	<0.02	Αŭ	<0.02	£	<0.02	PZ	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Z	40.02

(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

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.

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



800-368-1131 www.absolutestandards.com	100				Certified	Refer	Since Ma	Certified Reference Material CRM	1/203 (A	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	ANAB ISO 17034 Accredited AR-1539 Certificate Number tps://Absolutestandards.com	credited Number rds.com
CERTIFIED WEIGHT REPORT:							Lot #		'	一				
Fart Number: Lot Number: Description:		57182 061522 Lead (Pb)			Solv	Solvent: 2	20510011	Nitric Acid		Hioram	ranvie Ea	peate		
Expiration Date:		081505				%	40.0	Nitric Acid		Formulated By:	Giovann	Giovanni Esposito	061522	
Recommended Storage: Nominal Concentration (µg/mL):		Ambient (20 °C) 10000	(2)				(JE)			Sh	Ha.	(A		
NIST Test Number: 6UTB Weight shown below was diluted to (mL):	r: 6 as diluted	6UTB ad to (mL):	2000.02	5E-05 I	5E-05 Balance Uncertainty 0.058 Flask Uncertainty	ainty				Reviewed By:	Pedro L.	Pedro L. Rentas	061522	
Compound	RM#	Lot	Lot Nominal Purity Uncertaint Number Conc. (µg/ml.) (%) Purity (%)	Purity (%)	Purity Uncertainty Assay (%) Purity (%) (%)	- 1	Target Weight (g)	Expanded Actual Actual Uncertainty Weight (g) Conc. (µg/mL) +/- (µg/mL)	Actual onc. (µg/mL)	Expanded Uncertainty (4+/- (µg/mL) CAS#	SD: (Solvent Safe S# OSHA	SDS information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDSC	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->>	0 P	O		.0		0.00	9	02		08	0	100	
1.0E6													
m/z->	1100	190		04	i) Er	150	160	170	, T	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):

							Trace Me	tals	Verifica	tion	by ICP-	SY	(ma/m)		,				
Parameter .	MAX BESTS MILITARIA	į	WORLD MANUFACTURE	Name of Street, or other Persons and Street,	3.540 Lot 3.62		(日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日	CAMPBELL					2	Cale of the last					
₹	<0.02	ਲ	<0.02	Ď	<0.02	H	<0.02	Li	<0.02	ž	<0.02	å	L	3	202	É	200		000
Sp	40.02	ථ	CD 2	ď	200	H	98	Ė	500	1	9			3	100	0.7	70.05	*	7000
4	•	-		1	7000	3	7070	3	70:05	ON.	7070>	2		22	40.02	e E	40.02	n	₹0.02
2	7.02	3	Z0:02	펽	Q0:05	且	Ø 002	Ä	40.01	ő	40.02	R		Ao	2002	Ę	200	27	5
ğ	<0.02	ඊ	<0.02	3	<0.02	<u>, 1-</u>	200	M	2002	Ď	8	10				1	70.0	-	7000
Ro	100	ę	000	-		i p	200		70.0	3	70.02	2		2 2	Z.0≥	<u> </u>	₹0:05	۶	A0.02
3	10.0	3	70.05	5	20100	ē	40.2	되	40. 2	۵,	40.02	Ru		Š	<0.02	T	4002	>	28
E E	<0.02	රි	<0.02	ජී	<0.02	2	<0.02	Mo	<0.02	Ā	<0.05	5	200	v	5	5	200	• [70.00
m	<0.02	Ĉ	40 02	An	200	£	Ŀ	712	5	4				3 1	70.07	7	70.02	7	20.02
			2010	200	70'07		7	DIG.	70'05	4	9.7	3		B	Ø.02	E	293	7.	3

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.

www.absolutestandards.com

Certified Reference Material CRM

R : 03 | 17 | 12



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

Diovanne

Nitric Acid

Solvent: 20510011

#ioj

Nitric Acid

350.0 (m)

7.0%

092122 092122 Giovanni Esposito Pedro L. Rentas Formulated By: Reviewed By:

SDS Information	(Solvent Safety Info, On Attached pg.)	L) CAS# OSHA PEL (TWA) LD50
Expanded	Actual Actual Uncertainty	1/- (vg/mL)
	Actual	Conc. (ug/mL)
		_
	arget	Weight (g)
	Assay	9
1	unity Unkertality Assay	runty (%)
District	L CONTRACT	R
Mominal	Conc (un/ml)	COINCE (ARRY IIIIL.)
ŧ	Number	
	RM#	
	Compound	

5E-05 Balance Uncertainty 0.12 Flask Uncertainty

5000.1

Weight shown below was diluted to (mL):

NIST Test Number:

Ambient (20 °C)

10000 **6UTB**

092125

Expiration Date: Recommended Storage: Nominal Concentration (µg/mL):

Iron (Fe) 092122

Description: Lot Number:

Part Number:

CERTIFIED WEIGHT REPORT:

128 128	orl-rat 7500mg/kg 3126a	5 mg/m3	1403-08-0	Ш										
			200 7430.00.6		0.10 100.0 50.0034 50.0111 10001.5	50.0111	50.0034	100.0	0.10	99.985	10000	2224912-500	IN34¢	Iron (Fe)
N KE	LUSO	(VMI) TI INS												
100	CuCi	OSHA PFI (TWA)	CAS#	+/- (ua/mL)	Conc. (ug/mL)	Weight (g) (Weight (g)	9	Funcy (%)	(8)	COLLEGE (AND THE)			
	sched pg.)	eric sarety Into, on Atta	AIDC)	CHICAL COUNTY					Printer America	100	Come free free!	Nimbor	RM#	Compound
		Uncertainty Assay Target Actual Actual Innortainty (Cokyon Color Let)	(Coh.	Incortainty	Actual	Actual	y Uncertainty Assay Target	Assay	Uncertainty	Purity	Nominal	5		

		1143-40 2224912-900	2000	99.985	0.10	100.0	50.0034	50.0111 10001.5	10001.5	20.0	7439-89-6	5 mg/m3	orl-rat 7500mg/kg 3126a
2.054	Spectrum No.1	[1] Spectrum No.1 [30.763 sec];58126.D# [Count] [Linear]	(Count] [Linear]										
1.0E4													
m/z.>	10	.O	30		- 4		-08	-09				_06	001
π/2->	110	120	130		140		150	160	170		180		500
5.0E7													
m/z->	210	220	230		240		250	260					

Certified Reference Material CRM





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

							Trace Me	stals	Verificat	ion b	y ICP-MS	<i>бп</i>) s	/mL)						
STORES OF THE PERSON	000		Sell Production		200														
4	70.02	3	70.05	ŝ	70'0>	Ē	7070>	3	40,02	ž	<0.10	£	40.02	ž	402	e	<0.02	≥	40.02
- Se	40.02	ඊ	40.2	山	<0.02	Ho	20.02	3	<0.02	ź	<0.02	Re	<0.02	জ	₹0 ,02	<u>1</u> 2	<0.02	מ	<0.02
As	Ø.2	ප	<0.02	큡	<0.02	멸	<0.02	Mg	<0.01	ő	<0.02	꿆	40.02	Ag	<0.02	F	<0.02	>	<0.02
Ba	40.02	ඊ	Ø.02	3	<0.02	ㅂ	40.02	Mn	<0.10	몺	<0.02	8	<0.02	g	40.2	Ē	<0.02	Z.	<0.02
Be	₩	ŏ	₹0.05	පී	<0.02	윤	<0.2	Hg	40.2	۵	<0.02	Ro.	40.02	8	₹0.02	ם	<0.02	<u>۲</u>	<0.02
Ä	<0.02	රි	Ø.10	ප	40.10	٦	<0.02	Wo	20.02	조	<0.02	Sm	<0.02	တ	<0.02	Sn	<0.02	Zu	<0.05
В	<0.02	ට	<0.10	Απ	<0.02	£	<0.02	PR	<0.02	M	<0.2	3	<0.02	Ta	<0.02	H	<0.02	Z	<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.

* 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.

2 of 2

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT:

Part Number:

Description: Lot Number:

58119 120822 Potassium (K)

Solvent: 20510011 Nitric Acid

Lot #

Javanva

アイクラクスで

60.0 <u>a</u>

2%

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 10000 Ambient (20 °C) 120825

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

3000.4

5E-05 Belance Uncertainty

0.06 Flask Uncertainty

Nitric Acid

Formulated By:

Giovanni Esposito

120822

Reviewed By:

Pedro L. Rentas

120822

12 [1]	Potassium nitrate (K)	Compound
[1] Spectrum No.1 [35.763 sec]:58119 D# (Count II Insert	IN034 KD022021A1 10000 99.989 0.10 37.6 79.7990 79.8075	Lot Nominal Purity Uncertainty Assay Target Actual RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Weight (g) C
35.763 se	10000	Nominal Purity Uncertainty Assay Conc. (µg/ml.) (%) Purity (%) (%)
9C]:58	99.999	Purity (%)
119.0	0.10	Uncertainty Purity (%)
# []	37.6	Assay (%)
inti II ina	79.7990	Target Weight (g)
	79.8075	Actual Weight (g)
	10001.1	Actual Conc. (µg/mL
	10001.1 20.0 7757-79-1	Expanded Uncertainty +/- (µg/mL)
	7757-79-1	(Solv
	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-rat 3015 mg/kg 314	n tached pg.) LD50
	kg 3141a	NIST

m/z-y	5000	m/z->	1.0E5	m/z->	1.000	2.016
whiteless was commented about	and distinct manage gaps game in the six strending means a			, , , , , , , , , , , , , , , , , , ,		
210		110		ō		
J		0				
220		ก		N.		
230		130		3		
N 4 0		4.		4		
N U		50		Ø.		
				-		
20 0		160		0		
		170		8		
		180		Ö		
		190		0		
		A.				
		200		100		,

Lot # 120822

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

	Bi Be	
	4000 4000 4000 4000 4000	
	585888 8	
Œ	40.02 40.02 40.02 40.02 40.02	
	등 유 명 전 함 표 것	
	\$	
	3234483	1.
	402 402 402 402 402	Trace Me
	NA BA BA L L	etals
(T) = Tar	40.00 40.00 40.00 40.00 40.00 40.00 40.00	Verifica
Target analyte	K P P Z S Z N	ation
alyte	4022 4022 4022 4022 7	by ICP-
	S B B B B B	SW
	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	(Jm/gu)
	Ja Sr Na Se Se	
	402 402 402 402 402 402 402 402 402 402	
	计划证证证证	
	4000 4000 4000 4000 4000	
	55~\$<□≤	
	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	

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).

Lot # 120822

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

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

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
				3		
N 0		110		o .		
h				7		(
N N N		120		N. O		(
230		130		۵. ۵.		
						(
240		140		ò		
N		<u></u>		(h O		
250		150		0		
260		160		0		
		170		70		
		380		8 2.		
		0				
		190		90		
		N 0- 0		100		
		Ŏ		0		



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

			_				_			=
	B	ᄧ	Ве	В	As	Sb	Δ	Monthly		
	A).02	4 0.02	0,01	A .02	40.2	△0.02	△0.02			
	δ	පි	Ω	င္တ	දි	ర్జ	Ω			
	40.02	40.02)	40.02	40.02	40,2	△0.02			
	Æ	ဥ	වූ	ନ୍ଥ	멸	녆	Dy	80		
	40.02	40.02	40.02	<0.02	40.02	40.02	40.02	mineral differences		
	3	Ľ	स्र	Ħ	ď	ᅜ	Ж	Sheriff tool		
	40.02	40.02	40.2	A).02	<0.02	40.02	40.02		I race M	1
	폺	Мо	В.	Ķ	ВМ	Ē	П	MISSON ISSUE	Metals	1
3	A0.02	40.02	40.2	40.02	40,01	∆ .02	40.02	SI RECEIPTOR	Verification	
Towns and the	~	ን	70	굕	ô	₹	3	SHEWNING.	Clon	-
	∆ 0.2	40.02	40.02	40,02	40.02	40.02	40.02	THE PARTY OF THE P	by ICP-M	
	Sc	Sm	잗	공	Rh	æ	Pr		S (Hi	5
	<0.02	<0.02	<0.02	40.02	40,02	40.02	<0.02		g/mL)	
	Ta	S	ñ	Z.	Ą	Si.	Se			
	40.02	<0.02	40.02	402	40.02	40.02	402			
	==	Sn	Tm	Ħ	ᄇ	급	176			
	40,02	40.02	40,02	40,02	<0.02	40,02	<0.02	Contract Contraction		
	Zr	Zn	~	뀱	۷	Ϥ	W	可能を発展		
	<0.02	< 0.02	<0.02	<0.02	40.02	40.02	<0.02	SALES OF SALES		

(I)= larget analyte

Physical Characterization:

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

Certified by:

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

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

* 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

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 D50 102623 102623 3132 SRM

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



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

3	7,	3	-	A 62	20.	40.02	8	40.2	~	20.02	200	20.02	-	20.02	A	70.0>	2	20.02	ų.
					_			2	;	3	17.	3	2	3		3	>	3	,
8.65	Z ₁	∆ 0.02	So	8.8	s	40.02	Sm	40.02	7	<u>&</u>	Mo	<u>8</u> .02	F	<0.02	ද	40.02	පි	<u>6</u> .62	В
A0.02	×	40.02	Im	40.02	St	<0.02	Ru.	40.02	~	40.2	Вн	40.2	16	20.02	Ca	20.02	5	10.05	be
	_)	,		,		*	5	1	2		3	>	2	,
A)(2)	\$	40.02	T.	D 2	Z.	4 0.02	25	<0.02	Pd	ч	Mi	40.02	F	40.02	8	<0.02	င္တ	40.02	딿
40.02	<	40.02	=	20.02	Age	20.02	3	20.02	S	10.05	MIS	\$0.02	H	2002	2	20.02	5	6.	3
1	-		1	3		3	2	3	?	2	5	3	1	3	į	3	3	3	*
A0.02	<u>_</u>	∆ 20.02	7	20.02	22	A0.02	~	40.02	3	A0.02	딛	& 20.02	땅	40,02	땕	<u>6</u> 2	ប្ច	<u>8</u> .92	S
70.02	W	20.02	10	10.6	Ş	*0.0%		-	10.1	40.00	ļ			-	1	-	1		
3	W	200	#	3	3	2003	P	2000	Z	A) (93		200	Hf	A) A)	DV	20.02	5	40.02	AI
	STATE	STATE STATES OF			200000000000000000000000000000000000000	SPSS#250027	WASSERSON IN	Deli School Begratery	STATE STATES	SECTIMENT STATES	Name of Street, Street	HATTING TOWNS THE	Philipsen Str.					Contract of the last of the la	
						3/ 1117/		3											
						<u> </u>	スつい		100		etals	Trace ✓							

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).

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com

CERTIFIED WEIGHT REPORT



Certified Reference Material CRM

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

R:8/25) Lot # Solvent:

21110221

Nitric Acid

Part Number: Description: Lot Number: 58029 071723 Copper (Cu)

Recommended Storage: **Expiration Date:** Ambient (20 °C) 071726 2.0%

(mL)

40.0

Nitric Acid

Formulated By:

Benson Chan

071723

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): NIST Test Number: 1000 **BTU9** 2000.02 0.058 5E-05 Flask Uncertainty Balance Uncertainty Reviewed By: Pedro L. Rentas

Part

Lot

Dilution

Initia

Uncertainty

Nominal

Initial

 Copper(II) nitrate trihydrate (Cu) 58129 022723 0.1000 200.0 0.084 1000 10000.5 1000.0 2.2 10031-43-3 1 mg/m3 ori-rat 794 mg/kg

Number Number Factor Val. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LDSO 3114 SRM

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

071723

5.0E5 1.0E6 [1] Spectrum No.1 [33.422 sec]:58029.D# [Count] [Linear]

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

	[, <u>p</u>	. E	, <u>F</u>	ı A	35	- -		Γ	
	F					_		Statement of the last		
	20.02	200	8 2	20.02	40.2	40.02	0.02			
	2	. გ	. τ	<u>က</u>	<u>ြ</u>	ర్జ	Ω			
	-	, <u>6</u> , <u>9</u> 2	0.02	A).02	0.02	6 2	40.02	To and the second		
	Au	. Ce	ှင့	8	먇	Ħ.	Dy			
	€0.02	0.02	40.02	40.02	40.02	40.02	40.02			
	2	: [₹	F7'	5	Ήο	ЭH	DEPOSITOR NAMED IN		
	∆ 0.02	40.02	40.2	40.02	40.02	40.02	<0.02	HINNESS MAINSTERN	Irace M	1
	Z	Mo	ВH	Mn	Mg	£	Ē	WESTERSTE	etais	
Tarnet analyte	40,02	40.02	0.2	40.02	40.01	<0.02	<0.02	MESSENSITIVATION	Verifica	
de anak	×	29	ש	ъ	õ	¥	Z	STREET, SALES	tion	
40	∆0.2	40.02	40.02	40.02	40.02	<0.02	40.02	A SUSTINGUISMONS	oy ICP-N	
	Sc	Sm	Ŗ.	&	Rh	Re	뀨		is (hi	
	40.02	40.02	40.02	40.02	40.02	40,02	40.02		J/mL)	
	Ta	Ø	Sr	Z	A	S:	%			
	40,02	40.02	40.02	40:2	40.02	<0.02	<0.2			
	11	Sn	Tm	Ħ	ⅎ	금	Tb			ı
	40.02	40,02	40,02	40.02	<0.02	40.02	<0.02			
	Zr	Z	Υ	44	<	4	W	THE STREET, ST		
	<0.02	40.02	♦ 0.02	40.02	<0.02	<0.02	<0.02			

(I) = larget analyte

Physical Characterization:

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

Certified by:

2 of 2

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

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

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

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

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

www.absolutestandards.com



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-> M/2-> 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>				
	40,02	0.02	10.00	<0.02	402	<0.02	<0.02			
	5	ප	유	Ĉ	ද	ದ್	Ω	i		
	A).02	40.02	40.02	40.02	△0.02	40.2	<0.02			
	Au	ල	Ga	2	E	戽	Dy			
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
	7	La	Fe	F	Б	Но	出			
	<0.02	40.02	40.2	△0.02	<0.02	<0.02	<0.02		Trace Mo	
	Æ	Mo	Hg	Mn	Mg	Ę	<u>.</u> :		letals	
Ì	<0.02	<0.02	40.2	<0.02]	<0.02	<0.02		Verifica	
	×	면	7	Pd	õ	\$	Z		tion	
	40.2	40.02	<0.02	40.02	<0.02	<0.02	<0.02		by ICP-N	
	જ	Sm	Ru	RЬ	25	Re	77		n) Si	
	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		g/mL)	
	Ta	rs.	Sr	Na	βA	ī.	Se			l
	<0.02	40.02	<0.02	<0.2	<0.02	<0.02	40.2			
	Ti	Sn	Im	Th	Ħ	Te	σľ.			
	<0.02	40.02	0.02	40.02	40.02	40.02	<0.02			
	Zr	2	×	₩	<	c	¥			
	<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).

www.absolutestandards.com



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%

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	Verifical	cation	by ICP-M	1) SI	ua/mL)						
	THE STATE		Prostanting.	AUTHORNSON.				STREET, STREET,	SERVICE SECURITY	SECTION SECTIO	HENCON BUILDING	NAME OF TAXABLE PARTY.	. ш					A STATE OF THE PARTY OF THE PAR	
IA	<0.02	3	<0.02	δ	<0.02	H	<0.02	Ľ	<0.02	ž	<0.02	左	<0.02	Se	<0.2	176	<0.02	M	<0.02
Sp	<0.02	J	40.2	à	40.02	Н	<0.02	3	<0.02	£	<0.02	Re	<0.02	š	<0.02	ę	₹0.02	ם	40.02
As	407	ඊ	<0.02	립	₹0.02	ជ	<0.02	Mg	<0.01	ő	<0.02	묎	<0.05	Ag	<0.02	F	<0.02	>	<0.02
Ba	<0.02	ర	<0.02	3	<0.02	ㅂ	₹0.02	Mn	<0.02	Z	₹0.05	8	<0.02	ğ	40.2	Ħ	<0.02	Ą.	<0.02
å	Т	Ö	<0.02	5	40.02	£	<0.7	Hg	<0.2	Δ,	<0.02	Ru	40.02	Ş	<0.02	Tm	₹0.02	>	<0.02
Ä	<0.02	රි	<0.02	පී	40.02	ڌ	40.02	Mo	<0.02	盂	40.02	Sm	40.02	S	<0.02	S	<0.02	77	<0.02
æ	<0.02	ರೆ	<0.02	Αm	<0.02	£	40.02	PN	<0.02	M	<0.2	Sc	40.02	Ta	<0.02	F	<0.02	Z	<0.02

(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.

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

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

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

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

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



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

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

		Г
	B B B B B B B B B B B B B B B B B B B	ı
	4000 4000 4000 4000 4000 4000 4000 400	
	585555	
	40.02 40.02 40.02 40.02 40.02	
	OS EE EE DY	
	40.02 40.02 40.02 40.02 40.02 40.02	
	## ## ## ## ##	
	4000 4000 4000 4000 4000 4000	Trace N
	Mo Mn Li	etal
(T) = Tamet analyte	4002 4002 4002 4002	s Verific
met en	K P P P S N N	ation
shoto	40.02 40.02 40.02 40.02 40.02	by CP-
	S R R R R R	SN
	4000 4000 4000 4000 4000	
	S IS & S S E	
	40.02 40.02 40.02 40.02 40.02	
	はなばははは	
	4002 4002 4002 4002	
	* > > \$ × 2 ×	
	600 600 600 600 600	

(I) = larget analyte

Physical Characterization:

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

Certified by:

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

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

* 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

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:

						100	10000	CHICAGO CONTROL CONTRO	CHECK LABILLY	ianioc)	(Solvent Safety Into, On Attached pg.)	vttacned pg.)	22
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL) (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
Cobalt(II) nitrate hexahydrate (Co) 58127 050923 0,1000 200.0	58127	050923	0.1000		0.084	1000	10000	100001	00	10008.00.0	Company CO O		0770
								2000	41	0.770.001	O.UZ IIIgiritis	STEE SOCIETY OF HIGHER OF HIGHER OF HIGHER OF HIGHER	3113
(2									
			0 770		LA SPOLL NO	LOS ESTADOS LA	F 1						

1.056	8.065	m/z->	5.0E7	1.0E8	5.067
				F	
		0		0	
		0		120	
L 34-243 Secj.baok7.D# [Count] [Linear]		Ō		130	
		.0		140	
		.09		150	
		. O		100	
				170	
		02			
		80		160	
		00		00	
		001		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	g/mL)						
1					10 m	Name of	THE STREET, ST	SCHOOL STATE	ALL DESCRIPTION OF THE PERSON	10.000	AND SHARESTEEN STATES	STATE OF THE PERSON	China Marine	SCHOOL SECTION	Des Montal Control	SECONDO.			ALCOHOLD SALES
IV	<0.02	ಶ	1	Š	40.02 Dy 40.02	Ħ	<0.02	ij	<0.02	Z	<0.02	左	<0.00 √0.00	8	<0.2	TP	<0.02	B	<0.02
ౙ	40.02	రే	40 7	占	40.02	Но	<0.02	.3	₹005	Ź	₹0.02	2	<0.02	Š	40.02	Ę.	Ø.02	Þ	40.02
As	Q 5	ප	40.02	呂	40.02	ų	<0.02	Mg	10.05	ඊ	<0.02	됩	<0.02	Ag	20.0 ≥	F	40.02	>	₹0.02
쯃	40.02	చ	40.02	3	4002	ㅂ	<0.02	Ma	<0.02	콘	40.02	2	<0.02	Na	40.2	Ę	20:0≥	£	Ø.02
2	¥0.01	ඊ	20.02	පී	40.02	ક	40.2	쁀	\$ 20	م	₹0.02	æ	<0.02	Ş	20.05	Tm	Ø.02	>	<0.02
遥	40.02	රි	۳	Ğ,	200	្ន	<0.02	Mo	40.02	Æ	40,02	S	<0.02	S	40.02	Sn	40.02	Zn	₹0.02
æ	<0.02	ට්	<0.02	Αn	<0.02	윤	Z0.0>	P	<0.02	м	40.2	S	<0.02	F _{ee}	20'0>	Ħ	Ø.02	77	₹0.02

(T)= Target analyte

Physical Characterization:

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



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



Lot # 091923

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

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

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

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



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

m/z->	500	1000	N is m 4	m/z-y 5.0E4	1.025	2.0E5
						3
N 0		110		ō		[] Speatrum No.1
						Z 0.1
000		0		N.		ő
230		130		30		[34.433 sec]:57033.D# [Count] [Linear]
				er gere		90]:570
N 40		140		ò)33.D#
N 0		-d-		50		[Count]
Ö		Ö		0		Lines
N O		160		0		5
		170		70		
		180		80		
		0				
		190		90		
		an.	-			
		200		100		

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

	- H H H > /0 >	8	-
	As Sb Ba Bi Bi		
	4002 4002 4002 4002 4002		
	5 8 ជ ង 8 ជ ប		
	402 402 402 402 402 402 402		
	₹ ७८८ = = ⊅		
	6000 6000 6000 6000		
	322428		
	40.02 40.02 40.02 40.02 40.02	Trace N	
	N H M L L	letals	
9	40.2 40.2 40.2 40.2 40.2	Verifica	
= Target	M R P B O R R	E S S	
Target analyte	40.02 40.02 40.02 40.02	by ICP-N	
	S R R R R R	id) St	
R	4444 444 444 444 444 444 444 444 444 4	g/mL)	
	Ta Sr Na Sc		
	40.2 40.2 40.2 40.2 40.2 40.2		
	######################################		
(e)	40.02 40.02 40.02 40.02 40.02 40.02		
	Z Z Y Z < C &		
	40.02 40.02 40.02 40.02 40.02		

Physical Characterization:

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

Certified by:



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

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

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

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

R102109124

MURIC

Solvent: 21110221

Nitric Acid

Lot #

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

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:**

57115 041723

Description:

Phosphorous (P)

Expiration Date:

041726

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

BTUB

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02

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

1. Ammonium dihydrogen phosphate (P)

IN008 PV082019A1

10000

99,999

0.10

27.5

RM#

Compound

22%

40.0

Nitric Acid

Formulated By:

Lawrence Barry

041723

into

Reviewed By:

Pedro L. Rentas

Expanded SDS Information 041723

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

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

Part # 57115

1 of 2

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

	Γ							1	Г	Í
	F	= =	E E		AS	- 80		1		
	20.02	0.02	10.05	40.02	40.2	20.02	40,02			
	2	, S	υÇ	ů	£	. E	S			
	40,02	40.02	A)02	0.02	6 002	40.2	A)()2			
	Æ	ွင့	୍ଷନ	8	먑	턴	Dy			
	A0.02	A.02	40.02	∆ .02	40.02	A0.02	6 .02	WWW MANAGEMENT OF THE PARTY NAMED IN		
	128	5	냚	뱌	ī.	H	Hf			
	∆0,02	40,02	6 22	40.02	40.02	40.02	40.02	COMPANIES AND STATE	race Me	
	Æ	Mo	Hg	Mn	Mg	Lu	E	I	etals	ı
Townst analytic	40.02	∆0,02	402	40.02	₩.01	D00	40.02	Manning Algebra	Verifica	
	~	ጀ	۳	2	Ŝ	₹	Z		tion	١
	A 0.2	40,02	1	40,02	40.02	40.02	40,02		by ICP-N	
	Sc	Sm	Ru	2	R _b	Re	Pr		E SI	
	40.02	40.02	40.02	40.02	4 0.02	A0.02	40.02		g/mL)	
	Ta	Ø	ų	Z a	. ≱	Si	S			
	40,02	∆ .02	A.02	<u>8</u>	50,0	50.0	402	STATE OF THE PARTY		
	TI	Sn	Tm	∄	Ħ	Te	Ę.			
	<0.02	<0.02	<0.02	∆ .02	40,02	40.02	40,02			
	Zr	Zn	Υ.	\$	<	Ϥ	W			
	<0.02	6002	A).02	∆.02	∆ 0.02	A0.02	40.02	TOTAL PROPERTY OF		

(I)= larget analyte

Physical Characterization:

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

Certified by:

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

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

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

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

2 of 2

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



R1 02/09/124 Certified Reference Material CRM

M5816

CERTIFIED WEIGHT REPORT

Part Number:

Lot Number: Description:

57016 122923

Solvent:

122923

ASTM Type 1 Water

Lot #

Expiration Date: 122926 Sulfur (S)

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

Recommended Storage:

Ambient (20 °C)

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

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

Reviewed By:

Pedro L. Rentas

122923

tento

Formulated By:

Benson Chan

122923

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

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

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

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

(I) = larget analyte

Physical Characterization:

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

Certified by:

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

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

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

Certified Reference Material CRM

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->	2.565	5.0E5	1000	2000
				ė		
0		110		10		
N N O		120		P.O		
230		30		3 0		
240		140		40		
250		150		50		
260		160		8		
		170		70		
		180		8		
		190		90		
		200		100		

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

	B Bi Ba S A	Г
	40.02 40.02 40.02 40.02	
•	22 CG	
,	5848858	
1	40.02 40.02 40.02 40.02 40.02	
	PE P Dy P P P P P P P P P P P P P P P P P	
	40.02 40.02 40.02 40.02 40.02 40.02	
	# # # # # #	_
	40.02 40.02 40.02 40.02	Tace Me
	Hg Mo	etals
(T)= Tarnet analyte	40.02 40.02 40.02 40.02 40.02	Verifica
hanaka	K R O R o R N	ğ.
Ď		
	SH RE RE P	
	4022 4022 4022 4022	(m/m)
	Na Sr Sr	
	40.2 40.02 40.02 40.02 40.02 7	
	T T T T	ı
	40.02 40.02 40.02 40.02	
	2	
	666666666666666666666666666666666666666	

Physical Characterization:

(1)= larger analyte

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

Certified by:

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

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

02/09/24 M.5818

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

CERTIFIED WEIGHT REPORT:

Solvent: 24002546 Nitric Acid

2%

40.0 <u>a</u>

Nitric Acid

Formulated By:

Aleah O'Brady

22023

Description: 57014 122023 Silicon (SI)

Part Number:

Lot Number:

Recommended Storage: **Expiration Date:** Ambient (20 °C) 122026

Nominal Concentration (µg/mL): **NIST Test Number: BTU9** 1000

Weight shown below was diluted to (mL): Lot 1999.48 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Reviewed By: Uncertainty Expanded

IN009 SID082022A1 RM# Number Conc. (µg/mL) 1000 99,999 8 Purity (%) 0.10 14.4 8 Weight (g) 13.8854 Weight (g) Conc. (µg/mL) 13.8855 1000.0 +/- (µg/mL 2.0 16919-19-0 CAS# OSHA PEL (TWA) 2.5 mg/m3 orl-mus 70 mg/kg SRM

(Solvent Safety Info. On Attached pg.)

SDS Information

Pedro L. Rentas

122023

 Ammonium hexafluorosilicate (Si) [1] Spectrum No.1 NA

200

100

Areah o Brasky

1 of 2



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

T.	5	<u>B</u>	ķ	7 5	# :	As	30	2	A	i	Ī	
ŀ	_	_	_			_		_	1			
1000	3	40.02	10.05	20.0	3 1	8	20.02		40.02	The second second		
2	?	င္ပ	5	, Ç	3 5	<u>ئ</u>	C.	1	2			
20.02	3	∆ 0.02	<0.02	20.02	2 6	3	40.2	20.00	20.02	the Control of		
2		ക ക	G.	ğ	2 5	ਜੂ ਹ	Ħ	5	7	2000 per 1000 per		
20.02	3	8	A0.02	40,02	20.02	3	∆ .02	20.02	2000			
5	! }	5	ë	h	۱ ا	r'	픙	11	40			٠
40.02	0.04	A	40.2	40.02	20.02	3	∆ .02	20.02	000	SOMEON STREET,	ITACE M	,
Nd	1010	<u></u>	Нg	Mn	M	<u> </u>	Ē	E			verais	
40,02	10.04	3	6 2	40.02	10:03	2	20,02	20.02			Verinca	11
×	2	\$	٦	Pd	ç	,	\$	2	1		HOD	
40.2	20.02	3	∆.02	40,02	40.02		8.00	20.02		ŀ	by ICP-I	
Sc	300	î	₽	R	2	!	7	7		ļ	E S	
40.02	20.03	3	♦ 0.02	0,02	40.02		A	<0.02		ľ	g/mL)	
Ta	v	,	S.	Z	A A		2	Se				I
& .02	20.02	3	83.6	40.2	40.02		-1	40.2		-		
Ħ	Sn	9	ď	ij	Ħ	,	7	176				
40,02	20.02		20.02	40.02	40.02	20.02	3	40.02		The Real Property lies		
Zr	70	,	~	\$	<	-	=======================================	¥				
∆ 0.02	40.02	1010	A	40.02	40.02	10.02	3	40.02	O LEVER PROCESS			

(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

Part # 58030

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

	표표 등 등 등 S 도 도		
	40.02 40.02 40.02 40.02 40.02 40.02		
	585855		
	40.02 40.02 40.02 40.02 40.02		
	A C C E E E Dy		
	00000000000000000000000000000000000000		
	7 7 7 7 7 7 7 7		
	40.02 40.02 40.02 40.02 40.02	Trace Me	
	Mo H Mg L L.	letals	
Toward analyte	40.02 40.02 40.02 40.02 40.02 40.02	Verifica	
	* # # # # # # # # # # # # # # # # # # #	tion	
	40.22 40.22 40.22 40.22	by ICP-	
	×	SM	
	44444	ug/mL)	
	Ta S. Na Ag		
	40.02 40.02 40.02 40.02		
	######################################		
	4000 4000 4000 4000 4000 4000 4000 400		
100	당당<		
	6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		

(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).

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT: Lot #

Part Number: Lot Number: Description: 57015 091123 Phosphorous (P) Solvent: 24002546 2% 40.0 Nitric Acid Nitric Acid

Formulated By:

Lawrence Barry

091123

Pedro L. Rentas

091123

SDS information

rento

Nominal Concentration (µg/mL): Recommended Storage: **Expiration Date:** 1000 091126 Ambient (20 °C) (JE)

Weight shown below was diluted to (mL): **NIST Test Number:** BITUB Lot 2000.02 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Uncertainty Reviewed By: Expanded

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

Part # 57015

--z/m

210

220

230

240

250

260



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

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

	ľ	В	<u> </u>	Ħ.	ᆬ	200	Ę,	3		ş	2	4		
		A 022	20.02	3	- 60 10	70.02	3	70		A	2002	200		
ř.		<u>ნ</u>	8	,	Ω	Ç	?	g		ვ. 	2	2		
		A 68	20705	3	A 20.02	20.02	3	40.02		2	20,02	3		
		A II	Ę	1	ට ව	2	2	달	2	Į,	Ų			
		3	40.02		3	♦0.02)	8	20.02	3	∆ .02			
		ÿ	<u>_</u>		₹1	4		<u> </u>	0.0	F .	H	1		
	2000	3	<u> </u>	4.4	3	∆ 02		6 002	20.02	3	40.02	-		Trace M
	i de	ž	š	200	Ç	¥	9	X	Į,	•	5			<u>P</u>
3	20,02	3	<u>8</u>	7.03	3	∆ 0,02	1000	<u>^</u>	40,02	2	A 0,02			Verifica
Target	Ŀ	4	7	7	,	Z	Ş	Ş	S		Z			†:
Target analyte	ê	9	A)	_		8	10:04	3	A0.02		A) (2)		3	אי וכפרו
	Se.	•	S	¥.	,	₽	2	P	₽	:	Ŗ	Manager Street	F	100
	40.02		A S	40.02		A	70.05	3	<u>\$</u> 0.02	***************************************	A		g/ IIIL)	7
	Ta	,	^	ş		Z.	A	•	S	ş	ß	SANSON COM		
	40.02	70.02	3	∆ 0,02	i d	3	20,02	3	∆	ć	3			
	111	ě	?	Ĭ'n	Ē	;	Η	!	7	č				
	40.02	70.02	3	∆0,02	2000	3	∆ 0.02	2	200	20.02	300			
	Zr	2	7	<u>~</u>	16	\$	\ -		9	*				
	40.02	20.02	3	20.02	70.0>	3	<u>6</u> 0.02		A) (2)	20.02				

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.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.

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

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



Certified Reference Material CRM

Lot #

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

 Nickel(II) nitrate hexahydrate (Ni) Nominal Concentration (µg/mL): m/z-> Weight shown below was diluted to (mL): Recommended Storage: NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 210 110 0 N033 NIM052023A1 RM# 6UTB 57028 041124 1000 Ambient (20 °C) 041127 Nickel (Ni) Number <u>6</u> 220 20 [12.374 sec]:58128.D# [Count] [Linear] Conc. (µg/mL) Nominal 249.85 100 230 130 30 0.002 Flask Uncertainty 5E-05 Balance Uncertainty 99.999 Purity Uncertainty Assay 8 Purity (%) 0.10 240 140 40 **Solvent:** 24002546 8 2% 250 150 Weight (g) 50 1.2369 Target 1 5.0 Nitric Acid Nitric Acid Weight (g) 1.2369 Actual 260 160 60 Conc. (µg/mL) 1000.0 Actual 170 0 Reviewed By: +/- (µg/mL) Formulated By: Uncertainty Expanded 2.0 180 80 13478-00-7 CAS# (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Brian Geddes 190 90 OSHA PEL (TWA) SDS Information 1 mg/m3 200 100 orl-rat 1620 mg/kg 041124 041124 3136 NIST SRM

Part # 57028

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

								Ггасе Ме	tals	Verifica	tion	by ICP-I	Sh (μg/mL)						
>	1		1	40.02	Dy	<0.02	HH.	<0.02	11	<0.02	Z.	T	Pr	<0.02	Se	<0.2	4T	<0.02	*	<0.02
Sb	6 <0.02	2 Ca		<0.2	퍾	<0.02	Но	<0.02	Ē	<0.02	\$	<0.02	Re	40.02	S:	<0.02	Te	<0.02	ď	40.02
≥			_	<0.02	臣	<0.02	F	<0.02	Mg	40.01	ဝွ	<0.02	R.	<0.02	Ag	<0.02	∄	<0.02	<	40.02
Ba				<0.02	වු	<0.02	۲	<0.02	M	<0.02	Pd	<0.02	RЪ	<0.02	Na.	40.2	Ħ	<0.02	\$	40.02
Ве	_			<0.02	G	<0.02	Fe	<0.2	Hg	40.2	Þ	<0.02	Ru	40.02	S.	<0.02	Tm	<0.02	×	40.02
Bi				<0.02	දු	<0.02	La	<0.02	Mo	<0.02	¥	<0.02	Sm	40.02	S	<0.02	Sn	<0.02	Zn	40.02
В	H		r	<0.02	Au	<0.02	Pв	<0.02	M	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	11	<0.02	Zr	<0.02
										(T) - Towas analys		that								

= 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).

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



Certified Reference Material CRM

M5962 R! 06/14/24



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

m/z->	1.0E8	m/z->	1.0E8	m/z->	1.0≣4	2.0€4	1. Selenium (Se)	Compound	Volume sh	Nominal Concentration (µg/mL):	Expiration Date:	D	Pa	CERTIFIED WEIGHT REPORT:
210		110		10		[1] Speatrum No.1	58	Nui P	Volume shown below was diluted to (mL):	centration (µg/mL):	Expiration Date:	Description:	Part Number: Lot Number:	RT.
220		120		20			58134 071223	Part Lot Number Number	diluted to (mL):	1000	060627 Ambient (20 °C)	Selenium (Se)	57034 060624	
230		130		30		33.702 se	0.1000	Dilution	2000.07		6 C)	(Se)		
240		140		40		c]:58034.D	200.0 0.084	Initial Uncertainty Vol. (mL) Pipette (mL)	0.100 Flask Uncertainty					
250		150		50		33.702 sec]:58034.D# [Count] [Linear]	4 1000	Initial Uncertainty Nominal Vol. (mL) Pipette (mL) Conc. (µg/mL)	Flask Uncertainty			2.0%	24002546	Lot#
N 00 0		160		60		Linear]	10002.5				(mL)	40.0	Nitric Acid	Solvent:
J		170		70			1000.0	Initial Final Conc. (µg/mL) Conc. (µg/mL)				Nitric Acid		, ,
				80			2.2	Expanded Uncertainty +/- (µg/mL)	neviewed by.	1 1 1		Formulated By:		104
		180					7782-49-2	(Solvent S		in Re				
		190		90			0.2 mg/m3	SDS Information Safety Info. On Atta OSHA PEL (TWA)	redio L. nellias			Benson Chan	1, 1	
		00		100			orl-rat 6700 mg/kg	SDS Information (Solvent Safety Info. On Attached pg.) AS# OSHA PEL (TWA) LD50	000524	,		060624		
							3149	NIST	<u>L</u>	<u> </u>				

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

Г							Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
≥	<0.02	СЧ	<0.02	Dy	<0.02	Hf	<0.02	E.	<0.02	Ä	<0.02	Pr	<0.02	Se	H	Тъ	40,02	w	<0.02
Sb	<0.02	က္	<0.2	耳	<0.02	Ho	<0.02	Ę	<0.02	¥	<0.02	Re	40.02	S:	<0.02	Te	<0.02	U	<0.02
As	<0.2	೮	<0.02	臣	<0.02	Ħ	<0.02	Mg	<0.01	0°	<0.02	라	40.02	Ag	<0.02	∄	40.02	۷	<0.02
Ва	<0.02	Cs	<0.02	2	<0.02	ŀ	<0.02	Mn	<0.02	Pd	<0.02	₽	40.02	Ŋ	<0.2	Ħ	<0.02	ቷ	<0.02
Ве	40.01	ť	40.02	Ga	<0.02	Fe	<0.2	Hg	02	P	<0.02	Ru	40.02	Sr	<0.02	Tm	<0.02	¥	<0.02
В.	40.02	င္ပ	<0.02	G	<0.02	Ľ	<0.02	Mo	<0.02	7	<0.02	Sm	40.02	S	<0.02	Sn	40.02	Zn	<0.02
Б	<0.02	C)	<0.02	Au	<0.02	광	<0.02	M	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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

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

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

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

2 of 2



Refine your results. Redefine your industry.

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

Certificate of Analysis M5976, M5977 R : 02/22/24 P: 800-669-6799/540-585-3030 F: 540-585-3012 info@inorganicventures.com

info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

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



2.0 **PRODUCT DESCRIPTION**

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGMO1

Lot Number:

T2-MO720876

Matrix:

H2O

tr. NH40H

Value / Analyte(s):

1 000 µg/mL ea:

Molybdenum

Starting Material:

Ammonium Molybdate

Starting Material Lot#:

2361

Starting Material Purity: 99.9893%

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Value:

 $998 \pm 7 \, \mu g/mL$

Density:

1.000 g/mL (measured at 20 ± 4 °C)

Assav Information:

Assay Method #1

998 ± 4 µg/mL

ICP Assay NIST SRM 3134 Lot Number: 130418

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

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

Characterization of CRM/RM by Two or More Methods

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

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

Xi = mean of Assay Method : with standard uncertainty uchar i

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

u_{(s} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X_a = mean of Assay Method A with

ucher a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

```
0.008000 M Zn
M Ag <
          0.000590 M Eu <
                           0.000300 M Na
                                            0.000879 M Se <
                                                                               0.000598
M AI
          0.000563 M Fe <
                          0.006500 M Nb <
                                            0.029000 i
                                                       Si <
                                                                     M Zr <
                                                                               0.001800
M As <
         0.002100 M Ga <
                          0.000300 i
                                     Nd <
                                                   M Sm <
                                                              0.000300
M
   Au <
         0.000300 M Gd <
                          0.000300 M Ni <
                                            0.008000 M Sn <
                                                              0.008900
М
   B <
         0.003300 M
                    Ge <
                          0.000300 M Os <
                                            0.000590 M Sr
                                                              0.000175
                           0.001800 i
М
   Ba
          0.001689 M
                    Hf <
                                     P <
                                                   М
                                                      Ta <
                                                             0.004200
M
  Be <
         0.000890 M Hg <
                          0.003300 M Pb <
                                            0.000300 M
                                                      Tb <
                                                              0.000300
         0.000890 M Ho < 0.000300 M Pd <
M Bi <
                                            0.001800 M
                                                      Te <
                                                             0.021000
  Ca
         0.006334 M In < 0.032000 M Pr <
0
                                            0.013000 M Th <
                                                             0.000300
O Cd <
         0.026000 M Ir < 0.000300 M Pt <
                                            0.000300 O Ti <
                                                             0.032000
M Ce <
         0.008300 M K
                           0.130213 M Rb
                                            0.004575 M TI
                                                             0.001266
M Co
         0.000598 M La < 0.000300 M Re <
                                            0.000300 M Tm <
                                                              0.000300
                           0.000059 M Rh <
M Cr
         0.000527 O Li
                                            0.000300 M U <
                                                             0.005300
M Cs
         0.000527 M Lu <
                           0.000300 M Ru <
                                            0.079000 M V <
                                                             0.000890
М
   Cu
         0.002252 M Mg
                           0.000563 i
                                     S <
                                                   M W
                                                             0.087982
М
   Dy <
         0.000300 M
                    Mn <
                           0.005900 M
                                     Sb
                                            0.001513 M Y <
                                                             0.000300
М
  Er <
         0.000300 s
                    Mo <
                                  M
                                     Sc <
                                            0.001200 M Yb <
                                                             0.000300
```

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 24° C to minimize the effects of transpiration. Use at $20^{\circ} \pm 4^{\circ}$ C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 95.94 +6 6,7,8,9 [MoO4]-2(chemical form as received)

Chemical Compatibility -Mo is received in a NH4OH matrix giving the operator the option of using HCl or HF to stabilize acidic solutions. The [MoO4]-2 is soluble in concentrated HCl [MoOCl5]-2, dilute HF / HNO3 [MoOF5]-2 and basic media [MoO4]-2. Stable at ppm levels with some metals provided it is fluorinated. Do not mix with Alkaline or Rare Earths when HF is present. Stable with most inorganic anions provided it is in the [MoO4]-2 chemical form.

Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the [MoOF5]-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the [MoO4]-2 chemically stable for years in 1% NH40H in a LDPE container.

Mo Containing Samples (Preparation and Solution) -Metal (Soluble in HF / HNO3 or hot dilute HCl); Oxide (soluble in HF or NH4OH); Organic Matrices (Dry ash at 450EC in Pt0 and dissolve oxide with HF or HCl).

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

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 95 amu	3 ppt	n/a	40Ar39K16O,79Br1
			6O,190Os2+,190Pt
			2+
ICP-OES 202.030 nm	0.008 / 0.0002 µg/mL	1	Os, Hf
ICP-OES 203.844 nm	0.012 / 0.002 μg/mL	1	
ICP-OES 204.598 nm	0.012 / 0.001 µg/mL	1	Ir, Ta

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

- 10.1 ISO 9001 Quality Management System Registration
 - QSR Certificate Number QSR-1034
- 10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"
 - Chemical Testing Accredited / A2LA Certificate Number 883.01
- 10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"
 - Reference Material Producer Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 17, 2022

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

11.2 Lot Expiration Date

- July 17, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Uyen Truong Supervisor, Product Documentation

Meyer Trusing

Certificate Approved By:

Michael Booth Director, Technical Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director Paul R Saine

Certificate of Analysis 6652M , 8782M

MORGANIC NE NE SE SEGENE YOU TREST

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

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com



ACCREDITATION / REGISTRATION

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

PRODUCT DESCRIPTION

Catalog Number:

Single Analyte Custom Grade Solution Product Code:

CGTN

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

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

Starting Material Lot#: 2094 Starting Material: Ti Metal

Starting Material Purity: 99.9975%

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

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

Assay Information:

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

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

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

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

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

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

4.0 TRACEABILITY TO NIST

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

4.2 Balance Calibration

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

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

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below, solutions tested by ICP-MS were analyzed in an III bA-Bitter of ore each element, is reported below, solutions tested by ICP-MS were analyzed in an III bA-Bitter of the properties of the properties

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

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

Page 2 of 4

INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

> uA M 882000.0

> 9A M 886 0.000.0

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

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

> iN O 882000.0 > aO M 841200.0

> dN O 322500.0 > N M 862000.0

M - Checked by ICP-MS

Mn < Mg < Li <

> 0H

> 6H

ΉŁ

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

M 976800.0 > 8 i 84500.0 M 576800.0 > 8 M 782600.0

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

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

> 6T M 882000.0 > AT M 882000.0

sT M 034450.0 > dT M E70100.0

s 852000.0 M 882000.0

O.000269 O

O.043560 O

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

> II

JS

674000.0 228610.0

892000.0 892000.0

0.000268

699630.0

0.001341

892000.0

0.010560

960000'0

960000.0

73260.0 > nZ O 402100.0 038540.0 > nZ O 267400.0

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

7.7 Storage and Handling Recommendations

oM M 882000.0

0.000268 M K 0.000268 M K 0.000268 M K

0.000872 O Fe > 0.008586 M Ga <

O 892000.0

O S37000.0 M 882000.0

M 882000.0

M 603100.0

M 885800.0

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

INTENDED USE

W Et < O Cn <

O B <

IA O

4.1 Thermometer Calibration

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

Page 3 of 4

- Chemical Testing - Accredited / AZLA Certificate Number 863.01

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

- QSR Certificate Number QSR-1034

1.01 ISO 9001 Qualify Management System Registration

MOITATY STANDARD DOCUMENTATION 0.01

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

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

HOMOGENEITY

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

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

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

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

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

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

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

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

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

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

Twitte sociate in the secied 101 beg, trainspleaded for the orderiver in the shalfy concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss. - While stored in the sealed TCT bag, transpiration of this CRWRM is negligible. After opening the sealed TCT bag, transpiration in a negligible in the capture managed in the capture

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

Page 4 of 4

Chairman / Senior Technical Director

- Sealed TCT Bag Open Date:

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

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

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

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

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

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

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

Thomas Kozikowski Manager, Quality Control Certificate Approved By:

thibils Validity

- June 17, 2027 11.2 Lot Expiration Date

June 17, 2022 11.1 Certification Issue Date

Paul Gaines Certifying Officer:

0.Sr

0.11

CERTIFIED WEIGHT REPORT:

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



K S981 Reference Material CRM R S981







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

		060724				060724			ached pg.) NIST	LD50 SRM	S S S S S S S S S S S S S S S S S S S	1		
	Capeate	Giovanni Esposito	2	V	lord	Pedro L. Rentas		SDS Information	(Solvent Safety Info. On Attached pg.)	OSHA PEL (TWA)				
	Lievannie		1	!	N. P.				(Solve	CAS#	13520-83-7			
	Lieva	Formulated By:		1	13	Reviewed By:		Expanded	Uncertainty	+/- (ug/mL)	2.5			
		Nitric Acid				1-	ij		Final	Conc. (ug/mL)	1000.0			
Solvent:	Nitric Acid	40.0	(mf.)						Initial	Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL)	10001.5		near]	
Lot #	24002546	2.0%				sinty			Nominal	Conc. (ug/mL)	1000		2.D# [Count] [Linear]	
0						Balance Uncertainty	Flask Uncertainty		Uncertainty	Pipette (mL)	0.084		92.D# [c	
KI U						5E-05	0.100		Initial	Vol. (mL)	200.0		sec]:570	
	=	31		(၃			2000.07		Dilution	Factor	0.1000		[23.254 sec]:5709	
	57092 060724 Uranium (11)		060727	Ambient (20 °C)	1000	6UTB	d to (mL):		Lot	Number	58192 041524			
			*	- 24	<u></u>	:-	was dilute		Part	Number	58192		trum N	
CERTIFIED WEIGHT REPORT:	Part Number: Lot Number: Description:		Expiration Date:	Recommended Storage:	Nominal Concentration (µg/mL):	NIST Test Number:	Volume shown below was diluted to (mL):			Compound	1. Uranyl nitrate hexahydrate (U)		[1] Spectrum No.1	

1.0E6	5.0E5	m/z-> 5.0E4	2.5E4	m/z-> 1.0E6	S.OES	\.\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
[1] Spectrum No.1		0		011		C
		O		120		000
[23.264 sec]:57092.D# [Count] [Linear]		Og		130		.0
7092.D * [C		0		140		
ount] [Line		80		081		
ar]		O e		160		
		, 2		170		
		990		-@ -		
		Oe		081		
		100		200		

Lot # 060724





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

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

	Se
CP-MS (µg/m	40.02 Re <0.02 40.02 Rb <0.02 40.02 Rb <0.02 40.02 Rb <0.02 40.02 Sm <0.03 40.02 Sm <0.03
ication by I	Z & & Z a & x
letals Verif	Li <0.02 Lu <0.02 Mg <0.03 Mn <0.02 Hg <0.02 Mo <0.02 Nd <0.03
Trace A	Hf
	40.02 40 40.02 40 40.02 40 40 40 40 40 40 40 40 40 40 40 40
	0.02 Br 0.02 Br 0.02 Bu 0.02 Gd 0.02 Ga 0.02 Ga
	222222
	40.02 40.02 40.02 40.02 40.02 40.02
	B Bi B

(T) = Target analyte

Physical Characterization:

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





2 of 2

^{*} 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 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).

CERTIFIED WEIGHT REPORT:

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



Certified Reference Mater



fied Refe	rence Mai	fied Reference Material CRM	C		ANAB IS AR-153 https://ab	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	dited
¥	N # 10	4	2	2/11/0	>		
Solvent:	Solvent: 24002546 Nitric Acid	Nitric Acid		Control of the Contro			
2%	40.0	Nitric Acid		Formulated By:	Benson Chan	031524	
	(TE)			M	Hento		
Uncertainty				Reviewed By:	Pedro L. Rentas	031524	

Part Number: Lot Number:		19		Solvei	Solvent: 24002546 Nitric Acid	46 Nitr	ic Acid		A STATE OF THE STA	1		
Description:	Strontium (Sr)	(Sr)		Q	2% 40.0		Nitric Acid	, Itt	Formulated Bv:	Benson Chan	8	031524
Expiration Date:	031527							L	7	1		
Recommended Storage:	Ambient (20 °C)	(2)							1	A Company	1	
Nominal Concentration (µg/mL):	1000								June 1	Kena	΄ Δ	
NIST Test Number:	6UTB		5E-05 Ba	5E-05 Balance Uncertainty	<u>~</u>			Œ	Reviewed By:	Pedro L. Rentas		031524
Weight shown below was diluted to (mL); 2000.07	as diluted to (mL):	2000.07	0.100 Fla	0.100 Flask Uncertainty				I				
									Expanded	SDS Information	mation	
	Lot	Nominal	Purity U	Nominal Purity Uncertainty Assay	say Target		Actual Act	Actual U	Uncertainty	(Solvent Safety Info. On Attached pg.)	On Attached pg.)	TSIN
Compound	RM# Number Conc. (µg/mL) (%) Purity (%) (%)	Conc. (ug/mL)	(%)	urity (%) (9	6) Weight (g)		Weight (g) Conc. (µg/mL) +/- (µg/mL)	ug/mL) +	-/- (ug/mL) CAS#	# OSHA PEL (TWA)	NA) LD50	SRM

1. Strontium nitrate (Sr)		IN017 SRZ022018A1	1000	99.997	0.10	41.2	4.85470	4.85502	1000.1	2.0	10042-76-9	NA	orl-rat >2000mg/kg 3153a
5.0EG	[1] Spectrum No.1		[14.495 sec]:58138.D# [Count] [Linear]	sec]:581	38.D#	Coun	tj (Linea	-					
2.5E6													
m/z->⊶ 1.0E6	•	10 20		OG	0		.00	09	02		80	.Og	100
5.0ES	enempe emilier philosophical support which the												
m/z-≫ 5.0E6		110 120		130	041	1 ⁷²	150	160	7,0	i i	180	180	500
2.5E6													
ν-z/π	ų	210 220		230	240	14	250	280					



Absolute Standards, Inc.

www.absolutestandards.com

800-368-1131



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

	STATE	40.02	200	200	200	200	3 5	200
	SECTION SECTION	W	=	>	, \$	÷ >	, Z	7 2
	THE PERSON NAMED IN	<0.02	<0.02	<0.02	20.00	<0.02	200	200
	NO SEPTEMBER	92	Te	F	É	Į,	5	Ë
	MINISTER STATE	<0.2	<0.02	<0.02	<0.2	F	<0.02	<0.02
		Se	Si	Ag	Z e	Š	v)	Ę
(Jm/br/		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
MS (SIMIS.	Æ	Re	묎	8	Ru	Sm	Š
by ICP-I	Market Market	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	40.5
tion		ž	£	ő	몺	Д	ፈ	M
Verifica	New Contraction of the	<0.02	<0.02	<0.01	<0.02	<0.2	<0.02	<0.02
stals		3	5	Mg	Mn	Hg	Wo	ğ
race Me		<0.02	<0.02	<0.02	<0.02	Q 7	<0.02	<0.02
 		Hf	유	ų	卢	굕	2.	£
		<0.02	<0.02	<0.02	<0.02	<0.02	₹0.05	<0.02
	Total Park	Ďγ	占	亞	3	ජී	පී	Αn
	THE PERSON NAMED IN	<0.02	40.2	<0.02	<0.02	<0.02	<0.02	<0.02
	WO SERVIN	ਤ	ű	ರೆ	౮	Ċ	රි	ರೆ
	NAME OF STREET	<0.02	<0.02	<0.2	<0.02	<0.01	<0.02	<0.02
	The state of the s	Z	Sp	As	Ba	æ	Bi	В

(T) = Target analyte

Physical Characterization:

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



Certified by:

Lot # 031524

1. P

1 *

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

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

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

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

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

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

Certified Reference Material CRM

| MS982 | R: 6/11/24







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

	Carll		Secretary Comments of Comments	Nitric Acid Formulated By: Benson Chan 071423	7		flesh Mento	Reviewed By: Pedro L. Rentas 071423		Expanded SDS Information	Final Uncertainty (Solvent Safety Info. On Attached pg.) NIST	Vol. (ml.) Pipette (ml.) Conc. (µg/ml.) Conc. (µg/ml.) Conc. (µg/ml.) +/- (µg/ml.) CAS# OSHA PEL (TWA) LD50 SRM
Solvent:	Nitric Acid			40.0	(mL)						Initial	Conc. (µg/mL
Fot #	21110221			2.0%				ainty	£,		Nominal	Conc. (µg/mL)
								Balance Uncertainty	Flask Uncertainty		Uncertainty	Pipette (mL)
								5E-05	0.058		Initial	Vol. (mL)
			(Zr)			(2)			2000.02		Dilution	Factor
	57040	071423	Zirconium (Zr)		071426	Ambient (20 °C)	1000	6UTB	d to (mL):		Lot	Number
									was dilute		Part	Number
CERTIFIED WEIGHT REPORT:	Part Number:	Lot Number:	Description:		Expiration Date:	Recommended Storage:	Nominal Concentration (µg/mL):	NIST Test Number:	Volume shown below was diluted to (mL):			Compound

Zirconyl chloride	1. Zirconyl chloride octahydrate (Zr)	58140	58140 070621	0.1000	200.0	0.084	1000	10000.3 1000.0		2.2	13520-92-8	NA	NA	¥ Z
	[1] Spec	[1] Speatrum No.1		[41.153 sec]:57040.D# [Count] [Linear]	ec]:570	40.0# [Count (L	inear						
16	5.0 E6													
7,4% 1.0E	/z-:	0	O N	00		0	00	0	0.7	•	0	0	00	
ú)	6.0E7													
™.Z~3	0	011	0 20 0	08		04	90	160	170	4~	081	160	000	
ΰ	5.0E7													
K-2/LL		0 10	220	230		240	250	280						

Lot # 071423



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):

		91		_	-	_	_		-	-	-	_
			2000	7000	₹0.05	5	70.05	200		<0.02	200	20:00
		Simological Control	W		>	^	-	Ą.	;	-	Z,	1 4
		No. of the last of	<0.02		<0.02	200	70.0	€0.02	6	Z0:02	40.0 2	8
			£	E	<u>ല</u>	F	:	F	Ę	#	Sa	F
			8	8	70:05	200		97	8	70.05	8	900
	١		3	ö	5	Ag	9 ;	e Z	b	5 1	S	Ę
(mL)			Z0'02	2007	70.0	\$005	9	20:05	200	2000	\$0.05 \$	₹0.02
/b//)		ŀ	t	Z,	2	2	ģ	20	Ž	,	E	Sc
V ICP-MS	THE RESERVE THE PERSON NAMED IN	8	70.02	200		40.02 40.02	5	70.02	<0.02		70.05	<0.2
ion b	ı	N.	=======================================	ź		5	pd	2	<u>ը</u>	é	1	×
Verificat		60,00	70:04	₹ 0.02	9	<0.01	5	70:05	40.2	200	70:07	<0.02
stals		E	i	5	7,7	Mg	Min		<u>1</u>	Ž	OTAT	PN
Trace Me		<0.00	-	Ø.02	5	70:02	200		8	200	20:00	<0.02
		HF		HO	ĻĒ	=	طر		<u></u>	- 5	1	£
		<0.02		Z0102	200	7000	\$0.02	000	7000	<0.02	9	70'0>
		À	, ,	b	Ē	3	පි	Ċ	<u>5</u>	පී		T T
	STREET, STREET	<0.02	ç	707	<0.05		€ 0.02	8	70.02	40.02	5	Z0:02
	Total Control	ප	ć	3	ථ	: ,	ర	ď	j	රි	ć	3
	CONTRACTOR OF THE PERSON NAMED IN	<0.02	2000	70:02	40 5	-	Z0.0Z	500	10.0	Q.02	2007	70:07
	THE PERSON	₹	ů	3	As	5	Ra	Re	3	ā	ď	

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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







Printed: 6/7/2024, 3:58:47 PM

Lot # 071423

Part # 57040

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



R; 01/03/24 M6033 Certified Reference Material CRM

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

m/z->	1.006	2.016	m/z->	N O	5.0E6	m/z->	1.1.1.	2.5E5	6-6	5.0E5	Aluminum nitrate nonahydrate (Al)	Compound	Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Fyniret	Des	Fan Lot	CERTIFIED WEIGHT REPORT:
210			110			10				[1] Spectrum No.1	11	RM#	below was dilut	Number:	(µg/mL):	Storage:	Evniration Data:	Description:	Fart Number:	
220			120			20				_	IN022 ALM112021A1	Lot Number Co		6UTB	10000	Ambient (20 °C)	011636	Aluminum (Al)	011623)
230			130			30				5.014 sec]:	10000 99.999	Nominal Purity Conc. (µg/mL) (%)	2000.02 0.05	5E-0		<u>.</u>				
240			140			40				15.014 sec]:58113.D# [Count] [Linear]	9 0.10 7.30	Purity Uncertainty Assay (%) Purity (%) (%)	0.058 Flask Uncertainty	5E-05 Balance Uncertainty			2%		Solvent:	>
250			150			50				Count] [Line	0 273.9779	ay Target) Weight (g)		y		(1117)			it: 20510011	
260			160			60				»ar]	274.0078 1	Actual Weight (g) Con					Nitric Acid		Nitric Acid	
			170			70					10001.1 2	Actual Unce Conc. (µg/mL) +/- (Revi			Form	7	~e	7
			180			80					20.0 7784-27-2	Expanded (Si Uncertainty (Si +/- (µg/mL) CAS#		Reviewed By:	tach		Formulated By:	200 A contract	L'internation of	
			190			90					2 mg/m3	SUS Information Support Safety Info. On Attacon OSHA PEL (TWA)		Pedro L. Rentas	pena		Giovanni Esposito	(7	
			200			100						Attached		38	8		sito		e de	
											orl-rat 3671 mg/kg 3101a	pg.) NIST LD50 SRM		011623			011623			

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





paper m6039 Certificate of Analysis m6040

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

Revision No.: 0

Test	Specification	Result
ACS – Assay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	37.6 %
ACS – Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS - Specific Gravity at 60°/60°F	1.185 - 1.192	1.192
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS - Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS Free Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO ₄)	≤ 0.05 ppm	0.03 ppm
Sulfate (SO ₄)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO ₃)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH ₄)	≤ 3 ppm	< 1 ppm
Trace Impurities - Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities – Aluminum (AI)	≤ 10.0 ppb	< 5.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities – Barium (Ba)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 20.0 ppb	2.2 ppb
Trace Impurities - Cadmium (Cd)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	31.0 ppb
Trace Impurities - Chromium (Cr)	≤ 1.0 ppb	0.5 ppb
Trace Impurities - Cobalt (Co)	≤ 1.0 ppb	0.2 ppb
Trace Impurities - Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities - Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities - Gold (Au)	≤ 4.0 ppb	< 0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities - Iron (Fe)	≤ 15 ppb	3 ppb

>>> Continued on page 2 >>>





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

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

Hydrochloric Acid, 36.5-38.0%

BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis





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

Test Specification Result

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

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC





Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 **ACCREDITATION / REGISTRATION**

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



2.0 PRODUCT DESCRIPTION

Product Code:

Multi Analyte Custom Grade Solution

Catalog Number:

IV-STOCK-12

Lot Number:

U2-MEB734294

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Barium, Bismuth, Cobalt, Lithium.

Lead,

Beryllium, Cerium, Indium,

Nickel. Uranium

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

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

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

Assay Information:

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

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

u_{char a} = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 24° C to minimize the effects of transpiration. Use at $20^{\circ} \pm 4^{\circ}$ C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 21, 2023

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

11.2 Lot Expiration Date

- June 21, 2028
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

 Sealed TCT Bag Open Date 	e:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director

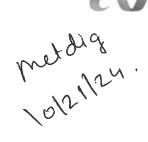
Paul R. Simo

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





M6095.



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

Revision No.: 0

Certificate of Analysis

Test	Specification	Result
ACS - Assay (as HCl) (by acid-base titrn)	36.5 - 38.0 %	37.6 %
ACS - Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS - Specific Gravity at 60°/60°F	1.185 - 1.192	1.192
ACS - Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS - Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS - Free Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO ₄)	≤ 0.05 ppm	0.03 ppm
Sulfate (SO ₄)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO ₃)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH ₄)	≤ 3 ppm	< 1 ppm
Trace Impurities - Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities - Aluminum (AI)	≤ 10.0 ppb	< 5.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities - Barium (Ba)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 20.0 ppb	2.2 ppb
Trace Impurities - Cadmium (Cd)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	31.0 ppb
Trace Impurities - Chromium (Cr)	≤ 1.0 ppb	0.5 ppb
Trace Impurities - Cobalt (Co)	≤ 1.0 ppb	0.2 ppb
Trace Impurities - Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities - Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities - Gold (Au)	≤ 4.0 ppb	< 0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 15 ppb	3 ppb

>>> Continued on page 2 >>>





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

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

Hydrochloric Acid, 36.5-38.0%

BAKER IÑŚTRA-ANALYZED® Reagent
For Trace Metal Analysis





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

Test Specification Result

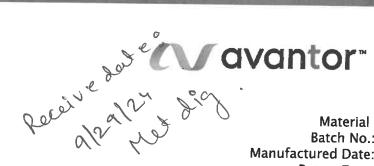
For Laboratory, Research, or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications Storage Condition: Store below 25 °C.

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC



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





Material No.: 9530-33

Batch No.: 22F0762009 Manufactured Date: 2022-05-10

Retest Date: 2027-05-09

Revision No.: 0

Certificate of Analysis

	Specification	Result	
ssay (as HCI) (by acid-base titrn)	36.5 - 38.0 %	37.6 %	
olor (APHA)	≤ 10	5	
esidue after Ignition	≤ 3 ppm	< 1 ppm	
pecific Gravity at 60°/60°F	1.185 - 1.192	1.190	
omide (Br)	≤ 0.005 %	< 0.005 %	
tractable Organic Substances	≤ 5 ppm	< 1 ppm	
ee Chlorine (as Cl2)	≤ 0.5 ppm	< 0.5 ppm	
te (PO ₄)	≤ 0.05 ppm	< 0.03 ppm	
O(4)	≤ 0.5 ppm	< 0.3 ppm	
O ₃)	≤ 0.8 ppm	0.3 ppm	
um (NH4)	≤ 3 ppm	< 1 ppm	
ourities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm	
ourities – Aluminum (Al)	≤ 10.0 ppb	0.8 ppb	
nd Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb	
purities – Barium (Ba)	≤ 1.0 ppb	< 0.2 ppb	
ourities – Beryllium (Be)	≤ 1.0 ppb	< 0.2 ppb	
urities – Bismuth (Bi)	≤ 10.0 ppb	< 1.0 ppb	
urities - Boron (B)	≤ 20.0 ppb	< 5.0 ppb	
urities – Cadmium (Cd)	≤ 1.0 ppb	< 0.3 ppb	
urities - Calcium (Ca)	≤ 50.0 ppb	14.9 ppb	
urities – Chromium (Cr)	≤ 1.0 ppb	< 0.4 ppb	
urities – Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb	
urities – Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb	
urities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb	
urities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb	
urities – Gold (Au)	≤ 4.0 ppb	0.2 ppb	
als (as Pb)	≤ 100 ppb	< 50 ppb	
rrities – Iron (Fe)	≤ 15 ppb	6 ppb	
urities – Gold (Au) als (as Pb)	≤ 4.0 ppb ≤ 100 ppb	0.2 ppb < 50 ppb	

>>> Continued on page 2 >>>





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

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

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





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

Test Specification Result

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

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC



Nitric Acid 69% **CMOS**

Receive: Avantor





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

Manufactured Date: 2024-01-25 Retest Date: 2029-01-23

Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (HNO ₃)	69.0 ~ 70.0 %	69.6 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO ₄)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





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

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

Nitric Acid 69% **CMOS**





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

Test

Specification

Result

For Microelectronic Use

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

Sr. Manager, Quality Assurance

Nitric Acid 69% **CMOS**

Receive: Avantor





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

Manufactured Date: 2024-01-25 Retest Date: 2029-01-23

Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (HNO ₃)	69.0 ~ 70.0 %	69.6 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO ₄)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities - Aluminum (AI)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities - Calcium (Ca)	≤ 50.0 ppb	< 0.2 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





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

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

Nitric Acid 69% **CMOS**





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

Test

Specification

Result

For Microelectronic Use

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

Sr. Manager, Quality Assurance

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT:

Part Number:

58111 122223

Sodium (Na)

Lot Number: Description:

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 10000

Weight shown below was diluted to (mL):

3000.4

0.06 Flask Uncertainty 5E-05 Balance Uncertainty

RW#

Number Lot

Nominal

Purity

Uncertainty Assay Purity (%)

Target

Actual

8

38

Recommended Storage:

Ambient (20 °C)

122226

Expiration Date:

Lot # M5807

Solvent:

24002546 Nitric Acid

2%

60.0 (III)

Nitric Acid

Formulated By: 13827 P Aleah O'Brady Back

Reviewed By: Pedro L. Rentas

122223

22223

Actual Uncertainty Expanded (Solvent Safety Info. On Attached pg.) **SDS Information** TSIN

CAS#

SE

1. Sodium nitrate (Na) IN036 NAV01201511 Conc. (µg/mL) 10000 98.999 0.10 26.9 111.5406 Weight (g) Weight (g) Conc. (µg/mL) 111.5479 10000.7 +/- (µg/mL) 20.0 7631-99-4 OSHA PEL (TWA) 5 mg/m3 ori-rat 3430 mg/kg 3152a

1 m/z-> 17/z-Y m/z-> N.5E6 5.0E6 2.5E6 5.0E6 2.5E5 5.0E5 [1] Spectrum No.1 210 110 0 220 120 NO. [8.935 sec]:58111.D# [Count] [Linear] 130 230 30 140 240 6 150 250 50 160 260 0 170 70 180 80 190 90 100 200

Part # 58111



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

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

	AS BE BE	
	40.2 40.2 40.2 40.0 40.0 40.0 40.0 40.0	
	585855	
	40.02 40.02 40.02 40.02 40.02 40.02	
	₹ 안 안 집 때 다 것	
	4422	
	27. 24 年 27. 24. 24. 24. 24. 24. 24. 24. 24. 24. 24	
	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Trace M
	Mo Mg Lu	fetals
(T) = Tar	442 442 442 442 442 442 442 442 442 442	Verifica
) = Target analyte	N N O B o K N	ation
ılytе	4000 4000 4000 4000 4000	by ICP-
	S R R R R	NO C
	400000000000000000000000000000000000000	(m/)
	T _a S ₇ S ₈	
	402 402 402 402 402	
	in Signal in the	ı
	40.02 40.02 40.02 40.02	

	600000000000000000000000000000000000000	

Physical Characterization:

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

Certified by:

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

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

* All standard containers are meticulously cleaned prior to use.

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

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



Certificate of Analysis
M5738 M5739 M5740 M5741 M5742

Refine your results. Redefine your industry.

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 **ACCREDITATION / REGISTRATION**

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



2.0 **PRODUCT DESCRIPTION**

Product Code:

Multi Analyte Custom Grade Solution

Catalog Number:

6020ISS

Lot Number:

S2-MEB709511

Matrix:

7% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Bismuth,

Holmium,

Indium,

6-Lithium.

Rhodium,

Scandium,

Terbium,

Yttrium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE 6-Lithium, Li6 **CERTIFIED VALUE** $10.00 \pm 0.03 \,\mu g/mL$

ANALYTE

CERTIFIED VALUE $10.00 \pm 0.05 \,\mu g/mL$

Bismuth, Bi

Indium, In

10.00 ± 0.04 µg/mL

Holmium, Ho Rhodium, Rh

 $10.00 \pm 0.05 \,\mu g/mL$ 10.00 ± 0.07 µg/mL

Scandlum, Sc

10.00 ± 0.04 µg/mL

Terbium, Tb

10.00 ± 0.04 µg/mL

Yttrium, Y

 $10.00 \pm 0.04 \, \mu g/mL$

Density:

1.035 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Bi	ICP Assay	3106	180815
Bi	Calculated		See Sec. 4.2
Но	ICP Assay	3123a	090408
Но	EDTA	928	928
In	ICP Assay	3124a	110516
In	EDTA	928	928
In	Calculated		See Sec. 4.2
Li6	Gravimetric		See Sec. 4.2
Rh	ICP Assay	3144	070619
Sc	ICP Assay	3148a	100701
Sc	EDTA	928	928
Tb	ICP Assay	3157a	100518
Tb	EDTA	928	928
Tb	Calculated		See Sec. 4,2
Υ	ICP Assay	3167a	120314
Υ	EDTA	928	928
Υ	Calculated		See Sec. 4.2

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

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

Certified Abundance:

IV's Certified Abundance

<u>Isotope</u>	Atom %
Lithium Li6	95.6 ± 0.3
Lithium Li7	4.4 ± 0.1

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 24° C to minimize the effects of transpiration. Use at $20^{\circ} \pm 4^{\circ}$ C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 03, 2021

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

11.2 Lot Expiration Date

- September 03, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRWRM can be supported by long term stability studies conducted on properly stored and handled CRWRMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth Director, Quality Control Michael 2 Both

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

RD: 07/14/2022

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

Instructions for QATS Reference Material: ICP-MS ICS

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

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

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

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

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to the Contracting Officer, Ross Miller at miller.ross@epa.gov. If directed by Ross Miller, return the chain of custody record with appropriate annotations and signatures to the address provided below.

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

(C) ANALYSIS OF SAMPLES

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

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





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

Instructions for QATS Reference Material: ICP-MS ICS

ICSB: M5874

ICSA-0803, Inferferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO₃. Analyze this solution by ICP-MS.

ICSB-0803, Analytes, mixed with ICSA-0803, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO₃. Analyze this ICSAB solution by ICP-MS.

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

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

ICSA: M5873

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-MS ICSA-0803, AND ICSA-0803 MIXED WITH ICSB-0803									
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)		
Al	20.0	[100000]			[100000]				
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0		
As	1.0	(0.1)	-1.9	2.1	19.0	16.2	21.9		
Ba	10.0	(1.2)	-18.8	21.2	(22.0)	2.0	42.0		
Be	1.0	(0)	-2.0	2.0	19.0	16.2	21.9		
Cd	1.0	(0.7)	-1.3	2.7	20.0	17.0	23.0		
Ca	500	[100000]			[100000]				
С		[200000]			[200000]				
CI		[1000000]			[1000000]				
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0		
Co	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0		
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0		
Fe	200	[100000]			[100000]				
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8		
Mg	500	[100000]			[100000]				
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1		
Мо		[2000]			[2000]				
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6		
Р		[100000]			[100000]				
K	500	[100000]			[100000]				
Se	5.0	(0.3)	-9.7	10.3	(19.0)	9.0	29.0		
Ag	1.0	(0)	-2.0	2.0	18.0	15.3	20.7		
Na	500	[100000]			[100000]				
S		[100000]			[100000]				
TI	1.0	(0)	-2.0	2.0	21.0	17.9	24.2		
Ti		[2000]			[2000]				
V	5.0	(0.5)	-9.5	10.5	(19.0)	9.0	29.0		
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0		

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

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

RD: 07/14/2022

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

Instructions for QATS Reference Material: ICP-MS ICS

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

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

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

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

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to the Contracting Officer, Ross Miller at miller.ross@epa.gov. If directed by Ross Miller, return the chain of custody record with appropriate annotations and signatures to the address provided below.

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

(C) ANALYSIS OF SAMPLES

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

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





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

Instructions for QATS Reference Material: ICP-MS ICS

ICSB: M5874

ICSA-0803, Inferferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO₃. Analyze this solution by ICP-MS.

ICSB-0803, Analytes, mixed with ICSA-0803, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 1% v/v HNO₃. Analyze this ICSAB solution by ICP-MS.

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

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

ICSA: M5873

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-MS ICSA-0803, AND ICSA-0803 MIXED WITH ICSB-0803									
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)		
Al	20.0	[100000]			[100000]				
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0		
As	1.0	(0.1)	-1.9	2.1	19.0	16.2	21.9		
Ba	10.0	(1.2)	-18.8	21.2	(22.0)	2.0	42.0		
Be	1.0	(0)	-2.0	2.0	19.0	16.2	21.9		
Cd	1.0	(0.7)	-1.3	2.7	20.0	17.0	23.0		
Ca	500	[100000]			[100000]				
С		[200000]			[200000]				
CI		[1000000]			[1000000]				
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0		
Co	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0		
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0		
Fe	200	[100000]			[100000]				
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8		
Mg	500	[100000]			[100000]				
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1		
Мо		[2000]			[2000]				
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6		
Р		[100000]			[100000]				
K	500	[100000]			[100000]				
Se	5.0	(0.3)	-9.7	10.3	(19.0)	9.0	29.0		
Ag	1.0	(0)	-2.0	2.0	18.0	15.3	20.7		
Na	500	[100000]			[100000]				
S		[100000]			[100000]				
TI	1.0	(0)	-2.0	2.0	21.0	17.9	24.2		
Ti		[2000]			[2000]				
V	5.0	(0.5)	-9.5	10.5	(19.0)	9.0	29.0		
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0		

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

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

www.absolutestandards.com



Certified Reference Material CRM

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: 57051 120523 BTU9 1000 120526 Ambient (20 °C) Antimony (Sb) 3000.41 0.058 5E-05 Flask Uncertainty Balance Uncertainty 24002546 Lot # 2.0% M.5802 Nitric Acid Solvent: 0.00 MSBOS Nitric Acid Formulated By: Reviewed By: Pedro L. Rentas Lawrence Barry 120523 120523

1. Antimony (Sb)

58151

100923

0.1000

300.0

1000

10001.4

1000.0

7440-36-0

0.5 mg/m3

orl-rat 7000 mg/kg 3102a

Number Part

Number Ď

Vol. (ml.)

Pipette (ml.) Conc. (µg/ml.)

Conc. (µg/mL)

Conc. (µg/ml.)

+/- (µg/mt.) Uncertainty Expanded

CAS#

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

LD50

SRM NIST SDS Information

Final

Dilution Factor

Initial

Uncertainty

Nominal

Compound

-2/m	1.057	m/z-> 2.0E7	2. 6 8	5.0E5	2.0 E	6.OE6
				to describe the second		
210		10		ō		
220		±		N		
0		N		N		
230		130		30		
240		.d.				
		140		ò		
0		180		50		
N O						
0		180		9		
		170		70		
		180		8 .		
		190		8		
				Constitution or section of the control of the contr		
		200		100		

Part # 57051



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

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

	-	Г	-					_					II	ľ	-	
		9	9	_	8		200	8	<u></u>	9	-	2	ı	I		
	70.0>	2 1	200	10.05		200	6	3	-		8					
		2	2 8	3	ζ.	9	ر ا	ξ	2	ದಿ		2		l		
		20.02	600	3	<u>8</u>	400	3	70.05	3	8	-	40.02				
	Ī	Aμ	, Ç	9	වී	٤	5	E E	1	Į,	1	Ž	Target State			
		∆ 022	70.02	3	∆ 002	2000	3	20.02		_ ∆0,02	3000	2002				
		3	2	1	ď,	=	7	5	1	H	111	HF.				
		₽	20.02	3	<u> </u>	20.02	3	A.03	-	200	2000	400		FI GCG IA	1300	
		Z	Mo		T.	MD		Z	l s	=	_			SECON	+2	I
(T) = Tamet analyte		40.00	20.02		<u>A</u>	40.02		<u>0</u> 01	4000	3	20.02	200		ACHILLA		
	Ŀ	~	7		Ð	Pd	!	ဂ္ဂ	M	Z	2			COL)	
akao	20.6	3	40,02	40.00	3	A0.02		2002	20.00	3	20.02			DY ICE-N		
	Ę	ç	Si	M	B	25		굣	700	9	7			S	10	
	20.02	3	20.02	20.02	3	∆ 0,02	40.04	3	20.02	3	8			g/mL)		
	Ē	3	S	IC	2	Z	26	A	2	?	Š		ı			ı
	20.05	3	40.0 2	70.0>	3	<u>A</u>	20.02	3	20.02		02	Section Control Control				
	E	3 1	S	I	1	=	11	3	ie.	į	J					
	20.02	0.00	A 62	40.02		A 83	20.02	3	∆0.02	-	900					
	177	1	7 _n	7	: ;	ş	_	4	9		W	Company				
	40.02	10.01	3	80.02	20.04	3	20.02	3	80.02	20.04	2000					

(1) = Target analyte

Physical Characterization:

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

Certified by:

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

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

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

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

Printed: 1/16/2024, 3:48:48 PM

Part # 57051

Lot # 120523

Certified Reference Material CRM

M6030



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

R = 8 | 5 | 24

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

800-368-1131

Absolute Standards, Inc.

Part Number: Solvent: 24002546 Lot # Nitric Acid

Lot Number: Description: 57047 122823 Silver (Ag)

Recommended Storage: **Expiration Date:** 1000 122826

Weight shown below was diluted to (mL): 4000.30

1. Silver nitrate (Ag)

IN035 J0612AGA1

1000.0

0.10

63.7

6.27992

6.27998

1000.0

2.0

7761-88-B

10 ug/m3

Z

3151

Nominal Concentration (µg/mL): NIST Test Number: **6UTB** Ambient (20 °C) 0.058 Flask Uncertainty 5E-05 Balance Uncertainty

2% <u>E</u> 80.0 Nitric Acid

Formulated By:

Benson Chan

122823

122823

Reviewed By: Pedro L. Rentas

Compound RM# Number 헏 Conc. (µg/mL) Nominal Purity Uncertainty Assay 8 Purity (%) 38 Weight (g) Target Weight (g) Conc. (µg/mL) Actual Actual +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) SDS Information NIST SRM

m/z-> m/z-> W-2/m 5.0E6 5.0E5 1.0≡6 2.5E6 5.0E6 1.0€7 [1] Spectrum No.1 210 110 0 120 NNO NO [14.044 sec]:58147.D# [Count] [Linear] 230 130 30 140 240 ò 150 250 50 260 160 00 170 0 180 0 190 000 200 100

www.absolutestandards.com



							race Me	letals	Verificat	tion	by ICP-I	S	ug/mL)						
No.	Will Will Street						The No. of the												
Ą	<0.02	${\mathfrak L}$	<0.02	Dy	<0.02	H	<0.02	Ľ	<0.02	Z	<0.02	7	<0.02	Se	<0.2	귱	<0.02	W	<0.02
Sb.	<0.02	င္က	40.2	咭	40.02	Но	<0.02	Ľ.	<0.02	3	40.02	Re	40.02	S:	40.02	근	∆ .02	┙	40.02
As	40.2	င္စ	<0.02	땰	40.02	'n	<0.02	Mg	<0.01	တ္တ	40.02	Rh.	<0.02	Ag	7	∄	∆ 0.02	<	40.02
Ва	<0.02	రి	40,02	8	<0.02	岸	40.02	Mn	<0.02	Pd	<0.02	R.	40.02	N	40.2	∄	<u>\$</u>	상	<0.02
Ве	40.01	Ω	<0.02	හු	<0.02	ਜ਼ਿ	40.2	Hg	40.2	P	40.02	Ru	∆ 0,02	Ž,	40.02	Ħ	<0.02	Κ.	< 0.02
₿.	<0.02	င္ပ	<0.02	႙ၟ	<0.02	2	<0.02	Mo	<0.02	77	∆ .02	Sm	40.02	Ś	40.02	S	A).02	Zn	40.02
В	<0.02	Cî	<0.02	Au	<0.02	Pb	<0.02	Z	<0.02	×	40.2	ç	40.02	T ₂	<0.02	Ħ	40.02	72	<0.02

Physical Characterization:

(T)= Target analyte

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

Certified by:

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

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

CAS#

OSHA PEL (TWA)

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

LD50

SRM SRM

0.10 41.2 24.2756 24.2758 10000.1 20.0 10042-76-9 Ι₹ orl-rat >2000mg/kg 3153a

Strontium nitrate (Sr

IN017 SRZ022018A1

10000

99.997

RM#

Number

Conc. (µg/mL)

8

Purity (%)

8

Weight (g)

Weight (g) Conc. (µg/mL) +/- (µg/mL)

Uncertainty

Expanded

닭

Nominal

Purity Uncertainty Assay

m/z-> m/z-> M/z-> 2.5E6 5.0E6 5.0E5 1.0E6 2.5 € 6 5.0E6 [1] Spectrum No.1 210 110 10 220 120 20 [14.495 sec]:58138.D# [Count] [Linear] 230 130 30 140 240 40 250 150 50 260 160 60 170 0 80 190 90 200 100

www.absolutestandards.com



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

П				П		Ш	Trace Me	tals	Verifica	tion	by ICP-	S	μg/mL)	П					
				I		I				ı	8	ı		۱					
A	<0.02	8	<0.02	Dу	<0.02	Ħ	<0.02	Ľ.	40.02	<u>Z</u> .	<0.02	P.	<0.02	Se	<0.2	<u>1</u>	<0.02	W	<0.02
SЬ	<0.02	Ca	<0.2	缸	△0.02	Но	<0.02	Lu	<0.02	子	<0.02	Re	<0.02	S:	<0.02	Te	0.02	Ϥ	<0.02
As	<0.2	රී	<0.02	땹	<0.02	F	<0.02	Mg	<0.01	္တ	<0.02	₽	<0.02	Ag	<0.02	∄	<0.02	<	△ 0.02
Ba	<0.02	ე ე	<0.02	ନ୍ଦ	<0.02	ī	<0.02	M	<0.02	Pd	<0.02	₽ B	<0.02	N ₂	<0.2	∄	<0.02	4	△ 0.02
Be	<0.01	ζ.	<0.02	ନ୍ଥ	<0.02	듔	<0.2	Нg	<0.2	Р	<0.02	ᇟ	<0.02	Sr	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	C _L	<0.02	Au	<0.02	Рь	<0.02	Nd	40.02	×	<0.2	Sc	<0.02	Ta	<0.02	1	<0.02	Zr	<0.02

Physical Characterization:

(T)= Target analyte

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

Certified by:

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

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

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

Part # 56138

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



Certified Reference Material CRM

M6023

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

		Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
Lot		ted to (mL):	8TUB	1000	Ambient (20 °C)	062727		Thalllum (TI)	062724	57081	
Nominal		2000.1			် (၄)						
Purity Uncertainty Assay		0.10 Flask Uncertainty	5E-05 Balance Uncertainty				2%			Solvent:	
Target						(mL)	40.0			Solvent: 24002546	Lot #
Actual							Nitric Acid			Nitric Acid	
Actual											
Uncertainty	Expanded		Reviewed By:	Juna	1		Formulated By:	4	TO SE	>	
(Solvent Safety Info. On Attached pg.)	SDS Information		Pedro L. Rentas	" freshies	A A		Aleah O'Brady	0	San O Basin	7	
ched pg.) NIST			062724				062724			,	
7											

RW#

Number

Conc. (µg/mL) (%)

Purity (%) (%)

Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM

-z/m	5.0E5	1.0E6	m/z->	5000	1.0€4	1.0E6	2.OE6	
N			-1				El opegrum No.	
210			10		ö		3	
220			120		N O			
							4 0	
230			130		9		[]4.044 sec]:57081.D# [Count] [Linear]	
240			<u> </u>		4		57081.	
ō			140		40		<u> </u>	
250			1		OI.		in order	
							000000000000000000000000000000000000000	
N			160		60			
			4		70			
			170		0			
			180		80			100
			190		90			or any
			200		100			
			ŏ		ŏ			See all see al
								0

Part # 57081



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

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

		Œ	10	<u>.</u>	Ве	t s	됐 S	AS		Sb		ΔI			
		∆ 0.02	20.02	3	<u></u> 0.01	70.02	3	4.6		<u>&</u>	40.00	2003	Philographic and Philog		
	ŀ	5 C	8)	t C	Ç	,	ç	,	ري و	Ş	2			
		40.02	20.02		40.02	20.02	3	40.02	; i	4	10.02	20.00			
		A	દ્ધ	1	G G	G	3	ᄪ		Į	Ly		STATE OF THE PARTY.		
	20,02	3	40.02		3	20.02	3	<u>8</u>	10.00	3	70.05	200			
		7	La	,	Ţ ^j	=	•	b'	24.0	E S	H			_	4
	70.02	3	∆ 0.02	ć	2	40.02		∆ 0.02	10.04	3	20.02			TACE ME	
		Ž	Mo	21.1	E .	M	q	¥ ₽	7.0	Ī	Ē			SIP	1
(T) = Target analyte	70.02	3	& 20.02	100	3	40.02		<u>A</u>	20.02	3	40,02			Verifica	7
et anal	F	4 .	7	7	J	Pd	Ş	<u>۾</u>	NO	Í	3		I	TON	
yte	2.05	b	<u>\$</u>	20,02	Š	<0.02	10,02	3	20.02	3	<u>8</u>			by ICP-	
	SC	,	S E	2	1	2	1	D.	Ke	;	7		١	₹ 7	
	A0.02	0.02	3	20.02	2	< 0.02	10.04	3	40,02		8		K	a/mL)	
	Ta	,	<i>n</i>	S.		Z	3		S	: ;	Se				I
	40,02	40.04	3	A0.02		40.2	20.03	3	A).02		40.2				
	11	011	?	ij		#	1.1	1	Te	ć	7				
	40.02	70.02	3	40.02	40.04	AD 03	_	3	<u>&</u> 20,02	40.04	2000				
	Zr	112	7	×	ć	ş	<	:	_ _	17	W	MANAGEMENT OF THE PERSON NAMED IN			
	40.02	20.02	3	<u>\$</u>	70.02	3	∆ .02		A 22	20.02	20.00	DISTRIBUTION OF THE PERSON			The second secon

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).

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

M6021

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

CERTIFIED WEIGHT REPORT Part Number: Lot Number: 57023 062424 24002546 Nitric Acid Solvent:

Nitric Acid

Ambient (20 °C) 2.0% (III) 40.0

Formulated By:

Aleah O'Brady

062424

ASSET O DE LONG

Recommended Storage:

Expiration Date:

062427

Description:

Vanadium (V)

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): **NIST Test Number: 6UTB** 1000 2000.3 5E-05 0.06 Balance Uncertainty Flask Uncertainty Reviewed By:

Pedro L. Rentas

062424

Ammonium metavanadate (V) Compound 58123 Number Part 021224 Number D D 0.1000 Dilution Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) 200.0 Initial Uncertainty 0.084 Nominal 1000 Conc. (µg/mL) Conc. (µg/mL) 10000.3 nitial 1000.0 Final +/- (µg/mL) Uncertainty Expanded 22 7803-55-6 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) 0.05 mg/m3 **SDS Information** orl-rat 58.1mg/kg LD50 3165 NIST SRM

7/2-7	P. 58 E. 6	m/z->- 5,0E8	1.0E7	m/z-> 2.0E7	1.0厘6	2.0E6
210		110		0		
220		1 20		N.		
Ö		Ö		0		
N G O		130		30		
N:				A		
N 4		140		0		
N 50		50		50		
b:						ı
260		160		60		
		170		70		
		d .		80		
		190		90		
		200		100		

Part # 57023



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

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

	r		_	-	_	-	-	-	-		T	۰
		3	B!	Ве	152	2	5	<i>?</i>	≥		ı	
		A 8	40.00	<u>6</u> ,01	20.02	2 6	4 6 5	3	<0.02			
		3 8	3	유	S.	<u>ج</u>	2 5	?	8			
	2000	3 8	3	40.02	40.02	20.02	3 6	3	A),02	THE REAL PROPERTY.		
		<u> </u>		<u>ئ</u>	2	Ę	1 12	7	ΔÅ			
	20.02	3 6	9 9	S	∆0.02	20.02	20.02	3	40.02	AND DESIGNATION		
	70	3 2	7 6	ş)	5	d	, но	1	HF			
	20.02	868	3 6	7	∆ .02	40.02	40.02	0.00	co oz		Irace M	1
	Z	MIO	1 0	5	M _D	Mg	Ē	. [etals	
(T) = Targ	8,02	20.02	200	3	∆ 002	10.0	40.02	10.02	2000		Verifica	
Target analyte	Ě	1 3	, ,	,	2	õ	Z	2			tion	
yte	40,2	40.02	20.02	3	& 83 83	40.02	40,02	20.02	3		by ICP-N	
	Sc	Sm	20	,		2	Re	7		ŀ	E S	
	40.02	40.02	40.02		4	∆.02	<0.02	20.02		ľ	g/mL)	
	Ta	s	Sr		Z,	Ag	δi	8				ı
	<0.02	40.02	40.02		3	∆ 0.02	6.02 20.02	<0.2				
	н	Sh	Tm	Ě	,	=	Te	16				
	<0.02	40.02	<0.02	10.02	3	40.02	40.02	40.02	The second second second			
	Zr	Zn	×	10	\$	V	Ϥ	₹	NAME AND ADDRESS OF			
	<0.02	∆ 0.02	40,02	20.02	3	-)	A).02	0.02	The state of the s			

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).