

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

8900, Fax: 908 789 8922

Prep Standard - Chemical Standard Summary

Order ID: P1187

Test: Metals Group 10

Prepbatch ID: PB166605,

Sequence ID/Qc Batch ID: LB134615,LB135084,

Standard ID:

MP78706, MP79051, MP84204, MP84218, MP84219, MP84223, MP84224, MP84225, MP84226, MP84227, MP84228, MP84230, MP84231, MP84232, MP84362, MP84636, MP84637, MP84638, MP84639, MP84640, MP84643, MP84644, MP84646, MP84649, MP84650, MP84721, MP84845, MP84846, MP84646, MP84650, MP84721, MP84845, MP84846, MP84646, MP84650, MP84721, MP84845, MP84846, MP84650, MP84721, MP84845, MP84846, M

Chemical ID:

M4883, M4884, M4891, M5130, M5192, M5218, M5223, M5288, M5296, M5298, M5393, M5395, M5429, M5467, M5472, M5496, M5497, M5643, M5649, M5658, M5697, M5698, M5735, M5747, M5748, M5762, M5769, M5789, M5792, M5798, M5799, M58000, M5801, M5802, M5806, M5808, M5811, M5814, M5815, M5816, M5817, M5819, M5820, M5875, M5959, M5962, M5970, M59780, M5985, M6021, M6023, M6028, M6030, M6032, M6077, M6121, M6126, M6127, M6128, M6137, M6144, M6146, M6147, M6150, M6152, M6155, M6156, W2606, W3112, M6152, M6156, W2606, W3112, M5816, M5817, M5819, M5981, M598



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME.	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
169	1:1HNO3	MP78706	12/20/2023	02/20/2025	Al-Terek Isaac	METALS_SCA	METALS_PIP	
						LE_2 (M SC-2)	ETTE_1 (ICP	12/20/2023
EDOM	1250 00000ml of M5735 ± 1250 0000	10ml of W26	806 - Final O	uantity: 2500 0	00 ml		A)	

FROM 1250.00000ml of M5735 + 1250.00000ml of W2606 = Final Quantity: 2500.000 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>	Sarabjit Jaswal
170	1:1HCL	MP79051	01/19/2024	02/20/2025		METALS_SCA	_	
						LE_2 (M SC-2)	ETTE_1 (ICP	01/19/2024

FROM 1250.00000ml of M5762 + 1250.00000ml of W2606 = Final Quantity: 2500.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
902	ICP AES CAL BLK (SO/ICB/CCB)	MP84204	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/27/2025

FROM 125.00000ml of M6121 + 2350.00000ml of W3112 + 25.00000ml of M6126 = Final Quantity: 2500.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
919	ICP AES INTERNAL STD	MP84218	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/27/2025

FROM 1.00000ml of M5959 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M6126 = Final Quantity: 2000.000 ml



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Recipe ID	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
903	ICP AES RINSE SOLN	MP84219	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/27/2025

FROM 200.00000ml of M6126 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
907	ICP AES STD S (S5)	MP84223	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM

5.00000ml of M5393 + 5.00000ml of M5467 + 5.00000ml of M5472 + 5.00000ml of M5802 + 5.00000ml of M5816 + 5.00000ml of M5875 + 5.00000ml of M5970 + 5.00000ml of M6077 + 455.00000ml of MP84204 = Final Quantity: 500.000 ml





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Metals STANDARD PREPARATION LOG

Recipe ID N	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabiit Jaswal
910	ICP AES STD S4	MP84224	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM	50.00000ml of MP84204 + 50.00000ml of MP84223	= Final Quantity: 100.000 ml
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Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
909	ICP AES STD S3	MP84225	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM 25.00000ml of MP84223 + 75.00000ml of MP84204 = Final Quantity: 100.000 ml



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Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3913	ICP AES STD S2	MP84226	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM 16.00000ml of MP84223 + 184.00000ml of MP84204 = Final Quantity: 200.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2950	ICP AES S1/CRI STOCK STD	MP84227	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM

0.00200 ml of M5816 + 0.00400 ml of M5978 + 0.03000 ml of M5798 + 0.03000 ml of M6028 + 0.05000 ml of M5298 + 0.05000 ml of M5978 + 0.05000 ml of M5496 + 0.05000 ml of M5658 + 0.05000 ml of M6030 + 0.06000 ml of M5747 + 0.10000 ml of M5472 + 0.10000 ml of M5697 + 0.10000 ml of M5801 + 0.10000 ml of M5962 + 0.10000 ml of M5970 + 0.10000 ml of M6128 + 0.15000 ml of M5800 + 0.20000 ml of M5748 + 0.20000 ml of M5799 + 0.20000 ml of M5819 + 0.20000 ml of M6021 + 0.20000 ml of M6023 + 0.25000 ml of M5802 + 0.50000 ml of M5814 + 0.50000 ml of M6032 + 1.00000 ml of M5192 + 1.00000 ml of M5288 + 1.00000 ml



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Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2951	ICP AES S1/CRI WORK STD	MP84228	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM 2.00000ml of MP84227 + 98.00000ml of MP84204 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
904	ICP AES ICSA SOLN	MP84230	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

FROM 25.00000ml of M5130 + 225.00000ml of MP84204 = Final Quantity: 250.000 ml



FROM

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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3494	ICP AES ICSAB SOLN-1	MP84231	01/24/2025	02/24/2025	Kareem Khairalla	None	None	01/28/2025

0.01000ml of M5815 + 0.01000ml of M5817 + 0.10000ml of M5472 + 0.10000ml of M5970 + 0.10000ml of M6077 + 10.0000ml of M5130 + 10.00000ml of M5223 + 79.50000ml of MP84204 = Final Quantity: 100.000 ml

Rec II		NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	ScaleID	PipettelD	Supervised By
	11	<u> </u>		01/24/2025	02/24/2025	Kareem Khairalla	None	None	Sarabjit Jaswal
						Kilalialia			01/28/2025

FROM 50.00000ml of MP84204 + 50.00000ml of MP84223 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	<u>NO.</u>	Prep Date		Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Mohan Bera	
912	ICP AES ICV SOLN	MP84362	01/25/2025	02/08/2025	Kareem Khairalla	None	None	02/07/2025	
FROM	FROM 0.02500ml of M5429 + 0.02500ml of M5815 + 0.02500ml of M5817 + 0.10000ml of M5467 + 0.25000ml of M5218 + 0.25000ml								

 $0.02500 ml \ of \ M5429 + 0.02500 ml \ of \ M5815 + 0.02500 ml \ of \ M5817 + 0.1000 oml \ of \ M5467 + 0.2500 oml \ of \ M5218 + 0.2500 oml \ of \ M5218 + 0.2500 ml \ of \ M5218 + 0.2500 ml \ of \ M5467 + 0.2500 ml \ o$ of M5472 + 10.00000ml of M6147 + 89.77500ml of MP84204 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u> 902	NAME ICP AES CAL BLK (SO/ICB/CCB)	NO. MP84636	Prep Date 02/25/2025	<u>Date</u> 03/25/2025	<u>By</u> Kareem	<u>ScaleID</u> None	PipetteID None	Sarabjit Jaswal
	10.7.2007.2021	<u> 0 .000</u>	02/20/2020	00/20/2020	Khairalla			02/28/2025

FROM 125.00000ml of M5792 + 2350.00000ml of W3112 + 25.00000ml of M5789 = Final Quantity: 2500.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
907	ICP AES STD S (S5)	MP84637	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM

5.00000ml of M5395 + 5.00000ml of M5467 + 5.00000ml of M5472 + 5.00000ml of M5816 + 5.00000ml of M5875 + 5.00000ml of M5970 + 5.00000ml of M6077 + 5.00000ml of M6146 + 455.00000ml of MP84636 = Final Quantity: 500.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
910	ICP AES STD S4	MP84638	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM 50.00000ml of MP84636 + 50.00000ml of MP84637 = Final Quantity: 100.000 ml





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Metals STANDARD PREPARATION LOG

909 ICP AES STD S3 MP84639 02/25/2025 03/25/2025 Kareem None None 02/28/2025	Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
	909	ICP AES STD S3	MP84639	02/25/2025	03/25/2025		None	None	02/28/2025

FROM 25.00000ml of MP84637 + 75.00000ml of MP84636 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3913	ICP AES STD S2	MP84640	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM 16.00000ml of MP84637 + 184.00000ml of MP84636 = Final Quantity: 200.000 ml



FROM

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Recipe ID	NAME.	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
912	ICP AES ICV SOLN	MP84643	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

0.02500 ml of M5429 + 0.02500 ml of M5815 + 0.02500 ml of M5817 + 0.10000 ml of M5467 + 0.25000 ml of M5472 + 10.00000 ml of M6150 + 89.77500 ml of MP84636 = Final Quantity: 100.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u> 904	NAME ICP AES ICSA SOLN	NO.	Prep Date 02/24/2025	<u>Date</u> 03/25/2025	<u>By</u> Kareem	<u>ScaleID</u> None	PipetteID None	Sarabjit Jaswal
904	TOP ALS IGSA SOLIN	IVIF 04044	02/24/2023	03/23/2023	Khairalla	None	None	02/28/2025

FROM 25.00000ml of M6152 + 225.00000ml of MP84636 = Final Quantity: 250.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
911	ICP AES CCV SOLN	MP84646	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
919	ICP AES INTERNAL STD	MP84649	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM 1.00000ml of M5959 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M5789 = Final Quantity: 2000.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
513	RINSE SOLN	MP84650	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM 200.00000ml of M5789 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
3494	ICP AES ICSAB SOLN-1	MP84721	02/25/2025	03/25/2025	Kareem Khairalla	None	None	02/28/2025

FROM 0.01000ml of M5815 + 0.01000ml of M5817 + 0.10000ml of M5296 + 0.10000ml of M5472 + 0.10000ml of M5970 + 10.00000ml of M6152 + 10.00000ml of M6155 + 79.50000ml of MP84636 = Final Quantity: 100.000 ml



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Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2950	ICP AES S1/CRI STOCK STD	MP84845	03/09/2025	03/25/2025	Kareem Khairalla	None	None	03/11/2025

FROM

0.03000 ml of M5798 + 0.03000 ml of M6028 + 0.04000 ml of M6137 + 0.05000 ml of M5658 + 0.05000 ml of M5808 + 0.05000 ml of M5808 + 0.05000 ml of M5808 + 0.05000 ml of M5811 + 0.05000 ml of M6030 + 0.06000 ml of M5747 + 0.10000 ml of M4883 + 0.10000 ml of M5472 + 0.10000 ml of M5697 + 0.10000 ml of M5698 + 0.10000 ml of M5801 + 0.10000 ml of M5820 + 0.10000 ml of M5970 + 0.15000 ml of M5800 + 0.20000 ml of M5748 + 0.20000 ml of M5799 + 0.20000 ml of M6021 + 0.20000 ml of M6023 + 0.25000 ml of M5846 + 1.00000 ml of M5748 + 0.50000 ml of M5799 + 0.20000 ml of M6032 + 1.00000 ml of M5288 + 1.00000 ml of M5840 + 1.00000 ml of M5866 + 1.00000 ml of M5978 + 1.00000 ml of M6156 + 2.00000 ml of M5816 + 77.68000 ml of MP84636 = Final Quantity: 100.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2951	ICP AES S1/CRI WORK STD	MP84846	03/09/2025	03/25/2025	Kareem Khairalla	None	None	03/11/2025

FROM 2.00000ml of MP84845 + 98.00000ml of MP84636 = Final Quantity: 100.000 ml



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	070221	09/07/2025	08/06/2021 / jaswal	08/05/2021 / jaswal	M4883
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	030921	03/09/2025	08/06/2021 / jaswal	08/05/2021 / jaswal	M4884
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	031921	05/19/2025	08/25/2021 / bin	08/05/2021 / jaswal	M4891
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
EPA	PART A / ICSA (ICP) STOCK SOLN	ICSA-1211	01/31/2025	05/20/2024 /	04/20/2021 / bin	M5130
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57042 / Mo, 1000 PPM, 125 ml	051722	05/17/2025	07/01/2022 / bin	06/17/2022 / jaswal	M5192
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti	S2-MEB711674	11/02/2026	07/01/2022 / bin	09/10/2021 / bin	M5218



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSAB (ICP) STOCK SOLN	ICSB-0710	01/31/2025	05/20/2024 /	04/20/2021 / bin	M5223
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 #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	S2-MEB711673	11/02/2026	09/19/2022 / jaswal	08/20/2022 / jaswal	M5296
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	020422	02/04/2025	05/02/2023 / jaswal	06/15/2022 / jaswal	M5298
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB714159	01/13/2027	10/12/2022 / bin	09/19/2022 / bin	M5393
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



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Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57103 / Li, 10000 PPM, 125 ml	070622	07/06/2025	01/30/2023 / bin	01/26/2023 / bin	M5429
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57058 / Cerium, 1000PPM, 100ML	020623	02/06/2026	03/06/2023 / bin	03/01/2023 / bin	M5467
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	082922	08/29/2025	01/14/2025 / Jaswal	03/16/2023 / jaswal	M5472
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58113 / AI, 10000 PPM, 500 ml	011623	01/16/2026	08/15/2023 / jaswal	03/17/2023 / bin	M5496
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	031523	03/15/2026	03/18/2023 / bin	03/17/2023 / bin	M5497
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Inorganic Ventures	WW-LFS-1 / Laboratory Fortified Stock Solution 1, 125 ml	T2-MEB723367	08/28/2024	08/18/2023 / bin	04/16/2023 / bin	M5643



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml	T2-MEB715594	02/17/2027	12/11/2023 / bin	04/16/2023 / bin	M5649
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	102523	10/25/2026	04/03/2024 / jaswal	10/27/2023 / jaswal	M5697
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58025 / Mn, 1000 PPM, 500 ml	102623	10/26/2026	04/18/2024 / jaswal	10/27/2023 / jaswal	M5698
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	23G1262003	06/12/2024	12/19/2023 / jaswal	06/26/2023 / Al-Terek	M5735
	1		Expiration	Date Opened /	Received Date /	Chemtech
Supplier	ItemCode / ItemName	Lot #	Date	Opened By	Received By	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Nickel (Ni) 1000PPM	091223	09/12/2026	01/02/2024 / bin	12/20/2023 / jaswal	M5748
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	0000281827	03/29/2026	12/29/2023 /	12/01/2023 / Al-Terek	M5762
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58112 / Mg, 10000 PPM, 500 ml	091823	09/18/2026	05/24/2024 / Jaswal	01/03/2024 / bin	M5769
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	23G1262003	07/30/2025	02/08/2024 / Al-Terek	06/26/2023 / Al-Terek	M5789
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22D1462006	08/05/2025	02/05/2024 / Al-Terek	02/24/2022 / Al-Terek	M5792
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57004 / Be, 1000 PPM, 125 ml	102523	10/25/2026	02/09/2024 / bin	02/09/2024 / bin	M5798



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57050 / Sn, 1000 PPM, 125 ml	071123	07/11/2026	02/09/2024 / bin	02/09/2024 / bin	M5799
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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 #
Absolute	58113 / AI, 10000 PPM,	122926	12/29/2026	12/18/2024 /	01/03/2024 /	M5808



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	051523	05/15/2026	02/06/2025 / kareem	01/03/2024 / jaswal	M5811
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57005 / B, 1000 PPM, 125 ml	071123	07/11/2026	03/26/2024 / Sohil	01/03/2024 / jaswal	M5814
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	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 #
Supplier Absolute Standards, Inc.	ItemCode / ItemName 57116 / S, 10000 PPM, 125 ml	Lot # 071123	-	-		
Absolute	57116 / S, 10000 PPM,		Date	Opened By 03/01/2024 /	Received By 02/09/2024 /	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL	T2-MEB714417	01/27/2027	04/19/2024 / jaswal	02/22/2024 / jaswal	M5875	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Inorganic Ventures	CGY10-1 / YTTRIUM 125mL 10,000ug/mL	V2-Y740548	02/20/2029	07/01/2024 / Jaswal	06/14/2024 / Jaswal	M5959	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57003 / Li, 1000 PPM, 125 ml	061224	06/21/2027	07/01/2024 / Jaswal	07/01/2024 / Jaswal	M5970	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #	
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	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 #	
Inorganic Ventures	CGIN10-5 / INDIUM 1 x 500 ml	U2-IN729349	02/21/2028	10/08/2024 / Jaswal	06/14/2024 / Jaswal	M5985	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57048 / Cd, 1000 PPM, 125 ml	070124	07/01/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6028	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #	
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030	
			Expiration	Date Opened /	Received Date /	Chemtech	
Supplier	ItemCode / ItemName	Lot #	Date	Opened By	Received By	Lot #	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	V2-MEB746762	09/06/2029	01/23/2025 / kareem	09/19/2024 / kareem	M6077
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	0000275677	05/13/2025	11/13/2024 / Eman	10/13/2024 / Eman	M6121
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	06/03/2025	12/03/2024 / Janvi	11/12/2024 / Janvi	M6126
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58112 / Mg, 10000 PPM, 500 ml	112124	11/21/2027	01/13/2025 / kareem	01/13/2025 / kareem	M6127
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier Absolute Standards, Inc.	ItemCode / ItemName 58025 / Mn, 1000 PPM, 500 ml	Lot # 101124	-	-		
Absolute	58025 / Mn, 1000 PPM,		Date	Opened By 01/13/2025 /	Received By 01/13/2025 /	Lot #



Fax: 908 789 8922

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	072424	07/24/2027	01/23/2025 / kareem	01/13/2025 / Jaswal	M6144
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	071724	07/17/2027	01/31/2025 / kareem	10/18/2024 / kareem	M6146
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV1-1014	02/08/2025	02/06/2025 / kareem	02/20/2020 / kareem	M6147
					1	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Supplier EPA	ItemCode / ItemName ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	Lot #		-		
	ICV-1 / ICV (ICP/ICPMS)		Date	Opened By 02/07/2025 /	Received By 04/20/2021 /	Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV1-1014	Date 07/07/2025 Expiration	Opened By 02/07/2025 / JANVI Date Opened /	Received By 04/20/2021 / JANVI Received Date /	Lot # M6150 Chemtech
EPA Supplier	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN ItemCode / ItemName PART A / ICSA (ICP)	ICV1-1014	Date 07/07/2025 Expiration Date	Opened By 02/07/2025 / JANVI Date Opened / Opened By 02/24/2025 /	Received By 04/20/2021 / JANVI Received Date / Received By 04/20/2021 /	Lot # M6150 Chemtech Lot #



Fax: 908 789 8922

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	032123	03/21/2026	11/06/2024 / JANVI	06/12/2024 / JANVI	M6156

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	10/24/2024	10/24/2019 / apatel	10/24/2019 / apatel	W2606

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

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM M5809

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

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: Description:

58113 122923

Aluminum (AI)

2%

Nitric Acid

40,0

Lot # M5808

Solvent: 24002546 Nitric Acid

Formulated By: Disvance Giovanni Esposito Jacob C

122923

Reviewed By: Pedro L. Rentas Cras 22923

Weight (g) Conc. (µg/mL) Actual +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) **SDS Information** LD50 NIST SRM

Compound

RM#

Number 5

Conc. (µg/mL)

8

Purity (%)

3

Weight (g)

Target

Actual

Nominal

Purity Uncertainty Assay

Nominal Concentration (µg/mL):

NIST Test Number:

EUTB 10000 Ambient (20 °C) 122926

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

 Aluminum nitrate nonahydrate (Al) m/2-> m/z-> 2.00€ 1.0E6 2.5E6 5.0E6 2.5E5 5.0E5 [1] Spectrum No.1 110 0 IN022 ALM092022A1 120 0 [15.014 sec]:58113.D# [Count] [Linear] 10000 130 30 99.999 0.10 140 40 7.30 273.9779 150 50 273.9813 160 0 10000.1 170 70 20.0 180 80 7784-27-2 190 0 2 mg/m3 200 100 ori-rat 3671 mg/kg 3101a

m/z->

200

220

230

240

250

200

Part # 58113

1 of 2

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

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Physical Characterization:

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

Certified by:

* 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).

Certified Reference Material CRM

M6032

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

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: 010924 57056 Solvent: 24002546 Lot # Nitric Acid Giovannie Lasas EL

Recommended Storage: **Expiration Date:** Description: Ambient (20 °C) 010927 Barium (Ba) 2% 40.0

Nitric Acid

Formulated By:

Giovanni Esposito

010924

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number: 6UTB** 1000 2000.02 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By: Expanded Pedro L. Rentas

Lot Nominal SDS Information

Barium nitrate (Ba) IN023 BAD022019A1 RV# Number Conc. (µg/mL) 1000 99.999 38 Purity (%) 0,10 52.3 8 Weight (g) 3.82417 Weight (g) Conc. (µg/mL) 3.82441 1000.1 +/- (µg/mL) 2.0 10022-31-B CAS# 0.5 mg/m3 SRM

Purity Uncertainty Assay Target Actual Actual Uncertainty

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

010924

orl-rat 355 mg/kg 3104a

[1] Spectrum No.1

m/z-> m/z-> m/z-> 2.5E6 5.0E6 2.0E5 1.0ES 2.0≡6 1.0E6 200 110 0 NNO 120 20 [12.514 sec]:58156.D# [Count] [Linear] 230 130 30 140 1040 4 150 NSO 50 160 1200 00 170 70 180 80 190 90 200 100

Part # 57056



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

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Physical Characterization:

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

Certified by:

- * 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

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):

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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



Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CHEM-CLP-4
Lot Number: S2-MEB711673
Matrix: 3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s): 1 000 μg/mL ea:

Boron, Molybdenum,

Silicon, Tin,

Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

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

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

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	110830
Мо	ICP Assay	3134	130418
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	3162a	130925

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

November 02, 2021

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

11.2 Lot Expiration Date

- November 02, 2026

- Sealed TCT Rag Open Date:

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

11.3 Period of Validity

		=	
This CDM/DM should not be us	and langer than one year (or civ	months in the case	of a 20 m

- Inis 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



Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CLPP-CAL-1

Lot Number: T2-MEB714417

Matrix: 5% (v/v) HNO3

Value / Analyte(s): 5 000 µg/mL ea:

Calcium, Potassium, Magnesium, Sodium,

2 000 µg/mL ea:

Aluminum, Barium,

1 000 µg/mL ea:

Iron,

500 μg/mL ea:

Nickel, Vanadium, Zinc, Cobalt,

Manganese, 250 μg/mL ea:

Silver, Copper,

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

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

Density: 1.118 g/mL (measured at 20 ± 4 °C)

Assay Information:

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	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151	160729
	Ag	Volhard	999c	999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	Ва	ICP Assay	3104a	140909
	Ва	Gravimetric		See Sec. 4.2
	Ве	ICP Assay	3105a	090514
	Ве	Calculated		See Sec. 4.2
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cr	Calculated		See Sec. 4.2
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	K	ICP Assay	3141a	140813
	K	Gravimetric		See Sec. 4.2
	Mg	ICP Assay	3131a	140110
	Mg	EDTA	928	928
	Mn	ICP Assay	3132	050429
	Mn	EDTA	928	928
	Na	ICP Assay	3152a	120715
	Na	Gravimetric		See Sec. 4.2
	Ni	ICP Assay	3136	120619
	Ni	EDTA	928	928
	V	IC Assay	3165	160906
	V	EDTA	928	928
	Zn	ICP Assay	3168a	120629
	Zn	EDTA	928	928

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 27, 2022

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

20178Ci



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 ACCREDITATION / REGISTRATION

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2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

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

> Arsenic, Lead, Selenium, Thallium,

500 µg/mL ea: Cadmium

1 000 µg/mL ea:

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

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

Thallium, TI 1 000 ± 7 µg/mL

Density: 1.043 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
TI	ICP Assay	3158	151215

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 13, 2022

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

11.2 Lot Expiration Date

- January 13, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

Sealed TCT Bag Open Date:	
· Sealeo TCT Bao Oberi Dale	

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

20178Ci



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 ACCREDITATION / REGISTRATION

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2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

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

> Arsenic, Lead, Selenium, Thallium,

500 µg/mL ea: Cadmium

1 000 µg/mL ea:

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

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

Thallium, TI 1 000 ± 7 µg/mL

Density: 1.043 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
TI	ICP Assay	3158	151215

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 13, 2022

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

11.2 Lot Expiration Date

- January 13, 2027
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

Sealed TCT Bag Open Date:	
· Sealeo TCT Bao Oberi Dale	

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

20178Ci

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

M5810 M5811

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

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: Description:

58126 051523 Iron (Fe)

R: 01/03/24

Solvent: 21110221 Lot # Nitric Acid

Formulated By:

J. Brans

であるから

5.0%

250.0

Nitric Acid

Giovanni Esposito

051523

Reviewed By:

Pedro L. Rentas

051523

Purity Uncertainty Assay 0.12 Flask Uncertainty Expanded SDS Information

Weight (g) Target Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS#

IN346 2302010-500 10000 99.995 0.10 100.0 50.0034 50.0111 10001.5 20.0 7439-89-6

1. Iron (Fe)

Compound

RM#

Number E E

Conc. (µg/mL)

36

Purity (%)

8

Nominal

Nominal Concentration (µg/mL):

NIST Test Number:

BTUB 10000

5E-05 Balance Uncertainty

Recommended Storage:

Ambient (20 °C) 051526

Expiration Date:

Weight shown below was diluted to (mL):

5000.1

Uncertainty

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

LD50

SRM

5 mg/m3 orl-rat 7500mg/kg 3126a

70 BO 90

100

m/2->

10

20

30

40

S O

60

1.054

2.0E4

[1] Spectrum No.1 [30.763 sec]:58126.D# [Count] [Linear]

1.0E8

200

m/z->

110

120

130

5.0E7

1.0E8-

5.0E7

230 240

250

260

1 of 2

Lot # 051523

T/2->

210

220

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

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

	Al Sb Ba	i i
	40.22 40.22 40.02 40.02 40.02	
	ទី ទី ១ ១ ១ ១ ១	
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	Au Ga	
	40.02 40.02 40.02 40.02	
	Ho Ho Pb	
	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Trace
		Met
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(T) = Tarnet analyta	40.21 40.22 40.22 40.23	erifica
	N R R R R R R	tion
	A A A A A A A A A A A A A A A A A A A	y ICP
		-MS
	S R R R R P	ng/r
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	Si Se Na Si Sr Sr	
	40.02 to 20.02 to 20.	
	20 H =	
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	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	
	7 7 × 4 × c €	
	40.02 40.02 40.02 40.02 40.02	

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

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

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Certified Reference Material CRM

Nitric Acid

40.0

(mL)

Nitric Acid

Expanded

20370011

2.0%



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

CERTIFIED WEIGHT REPORT: Lot # Solvent:

 Part Number:
 57034

 Lot Number:
 070221

Description: Selenium (Se)

Expiration Date: 070224

Recommended Storage: Ambient (20 °C)

Nominal Concentration (µg/mL): 1000

NIST Test Number: 6UTB 5E-05 Balance Uncertainty

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

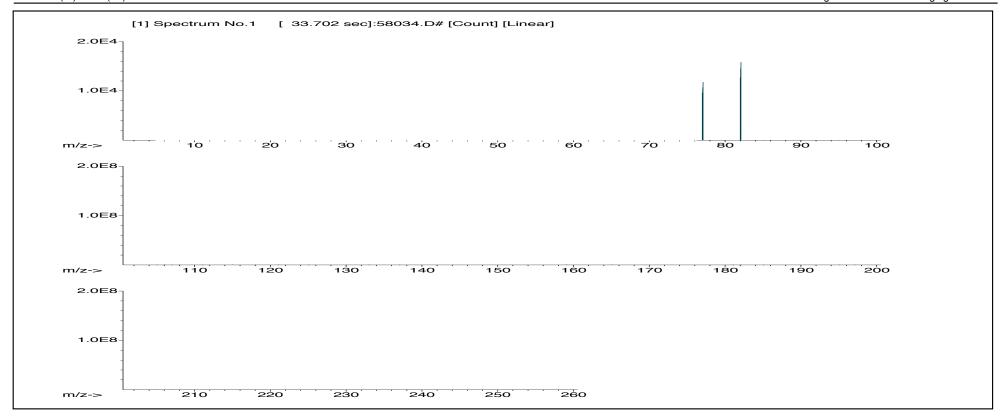
Formulated By: Giovanni Esposito 070221

Lector Denta 070221

Reviewed By: Pedro L. Rentas 070221

SDS Information

	Part	Lot	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solv	ent Safety Info. On A	Attached pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Conc. (µg/mL)	Conc. (µg/mL)	+/- (μg/mL)	CAS#	OSHA PEL (TWA)	LD50	SRM
 Selenium(IV) oxide (Se) 	58134	021621	0.1000	200.0	0.084	1000	10000.2	1000.0	2.2	7446-08-4	0.2 mg/m3	orl-rat 68 mg/kg	3149





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

Sn P. Shi

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

							Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	T	Tb	< 0.02	W	< 0.02
Sb	< 0.02	Ca	< 0.2	Er	< 0.02	Но	< 0.02	Lu	< 0.02	Nb	< 0.02	Re	< 0.02	Si	< 0.02	Te	< 0.02	U	< 0.02
As	< 0.2	Ce	< 0.02	Eu	< 0.02	In	< 0.02	Mg	< 0.01	Os	< 0.02	Rh	< 0.02	Ag	< 0.02	Tl	< 0.02	V	< 0.02
Ba	< 0.02	Cs	< 0.02	Gd	< 0.02	Ir	< 0.02	Mn	< 0.02	Pd	< 0.02	Rb	< 0.02	Na	< 0.2	Th	< 0.02	Yb	< 0.02
Be	< 0.01	Cr	< 0.02	Ga	< 0.02	Fe	< 0.2	Hg	< 0.2	P	< 0.02	Ru	< 0.02	Sr	< 0.02	Tm	< 0.02	Y	< 0.02
Bi	< 0.02	Co	< 0.02	Ge	< 0.02	La	< 0.02	Mo	< 0.02	Pt	< 0.02	Sm	< 0.02	S	< 0.02	Sn	< 0.02	Zn	< 0.02
В	< 0.02	Cu	< 0.02	Au	< 0.02	Pb	< 0.02	Nd	< 0.02	K	< 0.2	Sc	< 0.02	Ta	< 0.02	Ti	< 0.02	Zr	< 0.02

(T)= Target analyte

Physical Characterization: Certified by:

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

Part # 57034 Lot # 070221 Printed: 8/19/2021, 11:15:02 PM

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

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

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

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

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

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

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

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Certified Reference Material CRM

19410105

2.0%

Nitric Acid

Nitric Acid



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

CERTIFIED WEIGHT REPORT: Lot # Solvent:

> Part Number: 57014 030921 Lot Number:

Description: Silicon (Si)

60.0 **Expiration Date:** 030924 (mL)

Recommended Storage: Ambient (20 °C)

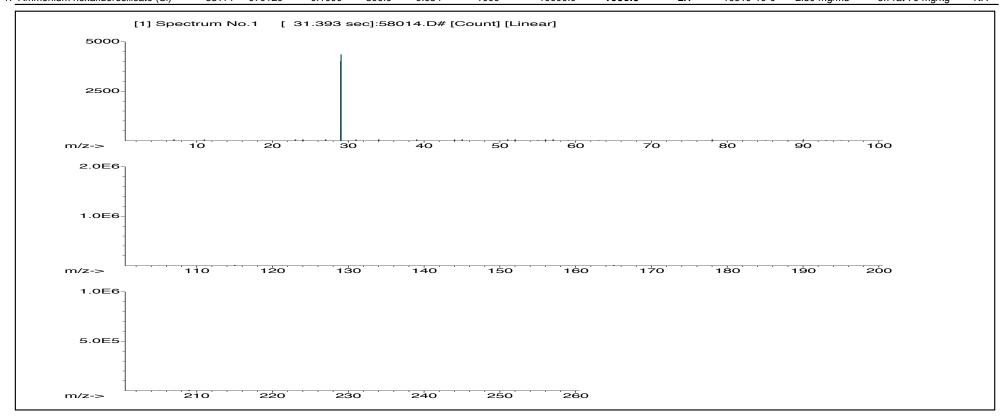
Nominal Concentration (µg/mL): 1000

> **NIST Test Number: 6UTB** 5E-05 Balance Uncertainty

Volume shown below was diluted to (mL): 3000.41 0.058 Flask Uncertainty

Formulated By: Lawrence Barry 030921 Reviewed By: Pedro L. Rentas 030921

									Expanded		SDS Informat	ion	
	Part	Lot	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solve	ent Safety Info. On A	Attached pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Conc. (µg/mL)	Conc. (µg/mL)	+/- (μg/mL)	CAS#	OSHA PEL (TWA)	LD50	SRM
Ammonium hexafluorosilicate (Si)	58114	070120	0 1000	300.0	0 084	1000	10000 0	1000.0	2.1	16919-19-0	2 50 mg/m3	orl-rat 70 mg/kg	NA





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

Bu P. All

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

							Trace M	etals	Verifica	tion	by ICP-M	S (μ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	< 0.02	Ca	< 0.2	Er	< 0.02	Но	< 0.02	Lu	< 0.02	Nb	< 0.02	Re	< 0.02	Si	T	Te	< 0.02	U	< 0.02
As	< 0.2	Ce	< 0.02	Eu	< 0.02	In	< 0.02	Mg	< 0.01	Os	< 0.02	Rh	< 0.02	Ag	< 0.02	Tl	< 0.02	V	< 0.02
Ba	< 0.02	Cs	< 0.02	Gd	< 0.02	Ir	< 0.02	Mn	< 0.02	Pd	< 0.02	Rb	< 0.02	Na	<0.2	Th	< 0.02	Yb	< 0.02
Be	< 0.01	Cr	< 0.02	Ga	< 0.02	Fe	< 0.2	Hg	<0.2	P	< 0.02	Ru	< 0.02	Sr	< 0.02	Tm	< 0.02	Y	< 0.02
Bi	< 0.02	Co	< 0.02	Ge	< 0.02	La	< 0.02	Mo	< 0.02	Pt	< 0.02	Sm	< 0.02	S	< 0.02	Sn	< 0.02	Zn	< 0.02
В	< 0.02	Cu	< 0.02	Au	< 0.02	Pb	< 0.02	Nd	< 0.02	K	<0.2	Sc	< 0.02	Ta	< 0.02	Ti	< 0.02	Zr	< 0.02

(T)= Target analyte

Physical Characterization: Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in 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 # 57014 Lot # 030921 2 of 2 Printed: 3/16/2021, 11:15:07 PM

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Certified Reference Material CRM

Nitric Acid

40.0

(mL)

Initial

Nitric Acid

Final

Expanded

Uncertainty

20370011

2.0%



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NIST

CERTIFIED WEIGHT REPORT: Lot # Solvent:

 Part Number:
 58030

 Lot Number:
 031921

Description: Zinc (Zn)

Part

Expiration Date: 031924

Recommended Storage: Ambient (20 °C)

Nominal Concentration (µg/mL): 1000

NIST Test Number: 6UTB 5E-05 Balance Uncertainty

Dilution

Initial

Uncertainty

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

Lot

Formulated By: Giovanni Esposito 031921

Licks Kenta

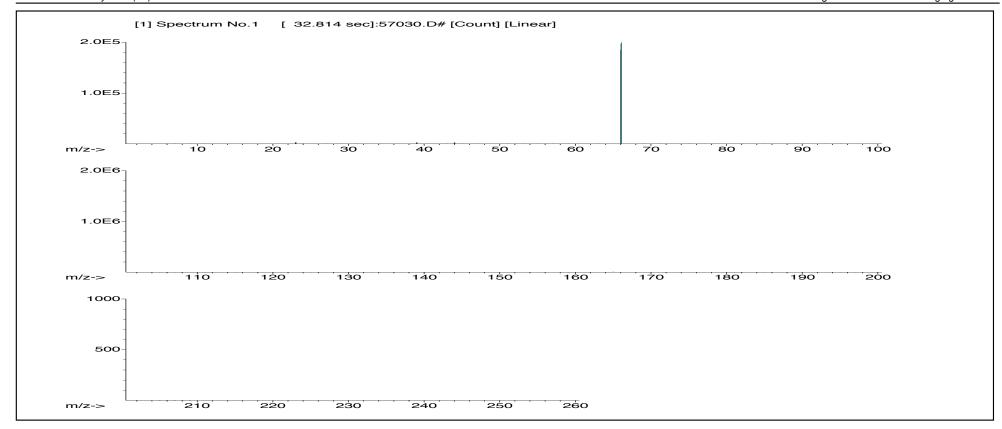
Reviewed By: Pedro L. Rentas 031921

SDS Information

(Solvent Safety Info. On Attached pg.)

Compound OSHA PEL (TWA) SRM Number Number Factor Vol. (mL) Pipette (mL) Conc. (μ g/mL) Conc. (μ g/mL) Conc. (μ g/mL) +/- (μg/mL) CAS# LD50 1000.0 1. Zinc nitrate hexahydrate (Zn) 58130 082020 0.1000 200.0 0.084 1000 10000.3 2.2 10196-18-6 1 mg/m3 orl-rat 1190mg/kg 3168

Nominal





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

Bn f. Sfla

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

							Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
Al	< 0.02	Cd	< 0.02	Dy	< 0.02	Hf	< 0.02	Li	<0.02	Ni	< 0.02	Pr	< 0.02	Se	<0.2	Tb	<0.02	W	< 0.02
Sb	< 0.02	Ca	< 0.2	Er	< 0.02	Но	< 0.02	Lu	< 0.02	Nb	< 0.02	Re	< 0.02	Si	< 0.02	Te	< 0.02	U	< 0.02
As	< 0.2	Ce	< 0.02	Eu	< 0.02	In	< 0.02	Mg	< 0.01	Os	< 0.02	Rh	< 0.02	Ag	< 0.02	Tl	< 0.02	V	< 0.02
Ba	< 0.02	Cs	< 0.02	Gd	< 0.02	Ir	< 0.02	Mn	< 0.02	Pd	< 0.02	Rb	< 0.02	Na	< 0.2	Th	< 0.02	Yb	< 0.02
Be	< 0.01	Cr	< 0.02	Ga	< 0.02	Fe	< 0.2	Hg	< 0.2	P	< 0.02	Ru	< 0.02	Sr	< 0.02	Tm	< 0.02	Y	< 0.02
Bi	< 0.02	Co	< 0.02	Ge	< 0.02	La	< 0.02	Mo	< 0.02	Pt	< 0.02	Sm	< 0.02	S	< 0.02	Sn	< 0.02	Zn	T
В	< 0.02	Cu	< 0.02	Au	< 0.02	Pb	< 0.02	Nd	< 0.02	K	<0.2	Sc	< 0.02	Ta	< 0.02	Ti	< 0.02	Zr	< 0.02

(T)= Target analyte

Physical Characterization: Certified by:

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

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

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

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

 $[\]star$ Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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

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





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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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







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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

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

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

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

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

ICSA M5126 M5127 M5128 M5129 M5130

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

value \pm 15 percent of the listed certified value.

ICSB

M5219

M5220

M5221

M5222

M5223

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Certified Reference Material CRM

M.5192 R: 06/17/2

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

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

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Physical Characterization:

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

Certified by:

* 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).



Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: CHEM-QC-4

Lot Number: S2-MEB711674

Matrix: 3% (v/v) HNO3
 3% (v/v) HF

3 /0 (V/V) I II

Value / Analyte(s): 1 000 μg/mL ea:

Boron, Molybdenum,

Silicon, Tin,

Titanium

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

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Boron, B $1\,000\pm7\,\mu\text{g/mL}$ Molybdenum, Mo $1\,000\pm5\,\mu\text{g/mL}$ Silicon, Si $1\,000\pm7\,\mu\text{g/mL}$ Tin, Sn $1\,000\pm5\,\mu\text{g/mL}$

Titanium, Ti $1 001 \pm 6 \mu g/mL$

Density: 1.032 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	110830
Мо	ICP Assay	3134	130418
Si	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	3162a	130925

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

November 02, 2021

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

11.2 Lot Expiration Date

- November 02, 2026

- Sealed TCT Rag Open Date:

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

11.3 Period of Validity

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This CDM/DM should not be us	and langer than one year (or give	months in the case	of a 20 m

- Inis 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 Sains





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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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







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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

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

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

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

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

ICSA M5126 M5127 M5128 M5129 M5130

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

value \pm 15 percent of the listed certified value.

ICSB

M5219

M5220

M5221

M5222

M5223

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Certified Reference Material CRM

5288



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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number:

58119 071122

Solvent: 20510011 Nitric Acid

Description:

Expiration Date:

Potassium (K)

Ambient (20 °C)

2%

Nitric Acid

40.0

(mL)

Recommended Storage: Nominal Concentration (µg/mL):

10000

071125

NIST Test Number:

6UTB

5E-05 Balance Uncertainty

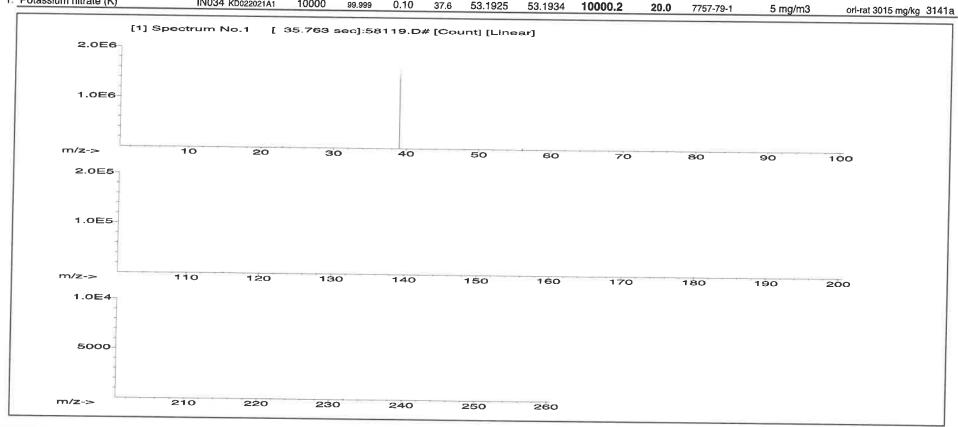
Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

Formulated By: Lawrence Barry 071122 Reviewed By: Pedro L. Rentas 071122

		Lat	Manager	5						Expanded		SDS Information	on	
Compound	D144	Lot	Nominal		Uncertainty	-	Target	Actual	Actual	Uncertainty	(Sol	vent Safety Info. On At	tached pg.)	NIST
- Compound	RM#	Number	Conc. (µg/mL)	(%)	Purity (%)	(%)	Weight (g)	Weight (g)	Conc. (µg/mL)	+/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	SRM
1. Potassium nitrate (K)	IN034	KD022021A1	10000	99 999	0.10	37.6	52 102E	E2 1024	10000 0	00.0				







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

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

							Trace M	etals	Verifica	atior	by ICP-	MS	(µg/mL)						
AI	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	< 0.02	Ca	< 0.2	Er	< 0.02	Ho	< 0.02	Lu	< 0.02	Nb	< 0.02	Re	< 0.02	Si	< 0.02	Te	< 0.02	U	< 0.02
As	<0.2	Ce	< 0.02	Eu	< 0.02	In	< 0.02	Mg	< 0.01	Os	< 0.02	Rh	< 0.02	Ag	< 0.02	TI	< 0.02	l v l	< 0.02
Ba	< 0.02	Cs	< 0.02	Gd	< 0.02	lr	< 0.02	Mn	< 0.02	Pd	< 0.02	Rb	< 0.02	Na	<0.2	Th	< 0.02	Yb	< 0.02
Be	< 0.01	Cr	< 0.02	Ga	< 0.02	Fe	< 0.2	Hg	< 0.2	P	< 0.02	Ru	< 0.02	Sr	< 0.02	l Tm l	< 0.02	Y	<0.02
Bi	< 0.02	Co	< 0.02	Ge	< 0.02	La	< 0.02	Mo	< 0.02	Pt	< 0.02	Sm	< 0.02	s	< 0.02	Sn	< 0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	< 0.02	K	T	Sc	< 0.02	Ta	< 0.02	Ti	< 0.02	Zr	< 0.02

(T)= Target analyte

Physical Characterization:

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

Certified by:

But All

- * 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 # **58119**

Lot # 071122

2 of 2

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		020422	ned pg.) LD50	orl-rat 7500mg/kg		
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	The state of the s	Giovanni Esposito	SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LDSG	5 mg/m3		
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	iovannie	ž () ::	(So CAS#	7782-61-8	08	
	Lien	Formulated By:	Expanded Uncertainty +/- (µg/mL)	20.0		
	`			15	170	
	_	_	Actual Conc. (ug/1	10001.5		
	Nitric Acid	Nitric Acid	Actual Actual Weight (g) Conc. (ug/mL)	30.0090	160	260
	Lot # 20370011	(mL)	Target Weight (g)	30.0044	150	250
	Solvent:	5.0% srtainty uinty	Assay (%)	100.0		
	Ø.	5.0% Balance Uncertainty Flask Uncertainty	Uncertainty Assay Purity (%) (%)	0.10	04 641	240
	86	5E-05 B	Purity L	99.999		
	M5298	0000.41	Nominal Conc. (µg/mL)	10000	[1] Spectrum No.1 [30.763 sec]:58126.D# [Count] [Linear] 10 20 30 110 120 130	230
	<u>152</u> (Fe)	020425 Ambient (20 °C) 10000 6UTB ed to (mL): 3	Lot Number C	221035107	20 20 120	FEV
	58126 020422 Iron (Fe)	020425 Ambient 10000 6UTB			30.763 sec	
	Ser: Ser:	ate: ige: nL): oer: w was di	RM#) IN346	10 10 110 110 110 110 110 110 110 110 1	;
Tac	Part Number: Lot Number: Description:	Expiration Date: 020425 Recommended Storage: Ambient (20 Nominal Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL):		1. Iron(III) nitrate nonahydrate (Fe)	[1] Spectr	
CEBTIFIED WEIGHT BEDORT	0 7 2	Explommenc ncentrati NIST Te		nonahy	2.0E4 1.0E4 1.0E8 1.0E8 1.0E8 1.0E8 1.0E8	
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AR-1539 Certificate Number https://Absolutestandards.com ANAB ISO 17034 Accredited

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

3533553	Trace Metals Verification by CP-MS (µc 0.02 Li 0.02 Ni 0.010 Ni 0.02 Re 0.02 Li 0.02 Ni 0.02 Re 0.02 Co 0.02 Re 0.02 Co 0.02 Re 0.02 Co 0.02 Co 0.02 Re 0.02 Co 0.03 C	C.O. T. A.O.O. T	Au < 0.02 Pb < 0.02 Nd < 0.03 Pt
Cd <0.02 Ca <0.02 Cs <0.02 Cr <0.02 Cr <0.02 Co <0.10			
8 5 5 5 5 5	-0.02-0.02-0.02-0.02-0.02	<0.10	<0.10
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(T)= Target analyte

Physical Characterization:

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



Certified by:

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^{*} 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 Deference Metaric Com

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

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

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

Γ						ar]	[9.619 sec]:58103.D# [Count] [Linear]	# [Co	58103.D	sec]:(_	No.1	ctrum	[1] Spectrum No.1	
5	Byfill 0241 ischio	2					9000								
MA	0.10 10.0 100.0134 100.0173 10000.4 20.0 7790-69-4 5 ma/m3 nd-sat 1428 ma/m NA	5 ma/m3	7790-69-4	20.0	10000.4	100.0173	100.0134	10.0	0.10	99.999	10000 89.889 0.	IN019 UZ042018A1	IN019		Lithium nitrate (Li)
SEM	LD50	RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50	CAS#	+/- (ug/mL)	Conc. (ug/mL)	Weight (g)	Weight (g)	(%)	Purity (%)	(%)	Conc. (µg/mL)	Number	RIM#		БПроппа
	Attached og.)	(Solvent Safety Info. On Attached pg.)	(Solv	Uncertainty	Actual	Actual	Target	Assay	Nominal Punty Uncertainty Assay. Target	Funty	Nominal	707			Commonia
	ition	SDS Information		Expanded								-			

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

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

							Trace Ma	stale	Varifics	tion	hy ICD	MC	(lm/m/)						
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Physical Characterization:

(T)= Target analyte

Certified by:

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

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

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

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

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

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

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

Part # 57103

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



Certified Reference Material CRM

R: 03/01/23(124)



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

					The state of the s			CERTIFIED WEIGHT REPORT: Part Number: 57058 Lot Number: 020623 Description: Cerlum (Ce)	Reviewed By: Pec	Expanded	Montanal Daniel Hannes Assess		TANIMAN FIRM PASSAV ISABET AFTIDI AFTIDI AFTIDI AFTIDI AFTIDI	remine runty undertainty assay larget Actual Uncertainty (Solvent Safety Info, On Attached og)	Location of the Constant of State of the Constant of Solvent Safety Info. On Attached pg.)	Number Conc. (John) (%) Purity (%) (%) Matche (%) Match	Conc. (ug/ml.) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (ug/ml.) CAS# CONC. (ug/ml.) (%) Purity (%) (%) Weight (a) Conc. (ug/ml.) CAS#
Solvent: 2110221 Nitric Acid Peritum (Ce) Solvent: 21110221 Nitric Acid Certum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry 020623 Cerlum (Ce) Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce) Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce) Cermulated By: Lawrence Barry Cer	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Lot # Lot # Lot # Solvent: 2110221 Nitric Acid Pedro L. Rentas D20623 Solvent: 2110221 Nitric Acid Pedro L. Rentas D20623 Comulated By: Lawrence Barry D20623 Company	Lot # Lot # Lot # Solvent: 2110221 Nitric Acid Pedro L. Rentas D20623 Solvent: 2110221 Nitric Acid Pedro L. Rentas D20623 Comulated By: Lawrence Barry D20623 Company	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty adjurted to (mL): 1000.12 0.058 Flesk Uncertainty Lawrence Barry 020623 Comulated By: Lawrence Barry 020623	Decureda	Nominal Durity Harasteints Assess Toward Assess			The same of the sa			Number Conc. (uo/ml.) (%) Purity (%) (%) Malake (a) Conc. (unity as)	Number Conc. (ug/ml.) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (us/ml.) CAS# COUNTRY INTO
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Lot #	Lot #	Lot #	Lot #	Lot #	Lot #	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cormulated By: Lawrence Barry Cug/mL): 1000 SE-05 Balance Uncertainty SE-05 Balance Uncertainty Selviewed By: Pedro L Rentas Selviewed By: Pedro L Rentas Selviewed By: Pedro L Rentas Selviewed By: Selvi	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cormulated By: Lawrence Barry Cug/mL): 1000 SE-05 Balance Uncertainty SE-05 Balance Uncertainty Selviewed By: Pedro L Rentas Selviewed By: Pedro L Rentas Selviewed By: Pedro L Rentas Selviewed By: Selvi	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Canadad SDS Information Excarded SDS Information	Disochardon I			Description of the second seco	Nominal Purity Uncertainty Assay Target Actual Actual Descriptor	Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Conc. (100/ml.) (94) Purity (94) (94) Purity (94) (94) Purity (94) (94)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Conc. (Jug/ml.) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (Jug/ml.) 1.7. (Jug/ml.) CAS.# OCUA PER JULIAN 1.7.
Lot #	Lot #	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty GUTB 5E-05 Balance Uncertainty Cont. Co	Lot # Lot #	Lot #	Lot #	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty				Manufact Characteristics Assessment	Nominal Purity Uncertainty Assay Tarnet Arrival Investment Coherent Coheren	Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	Lot Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Conc. (Loc/ml.) (9th Purity (9th Conc. (Loc/ml.) (9th Conc. (Loc/ml.) (9th Conc. (Loc/ml.) (9th Conc. (Loc/ml.) (9th Conc. (19th Conc. (19t	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Conc. (Jug/ml.) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (Jug/ml.) CAS.# OCUA PER JULIAN 1 PER PER
Lot # Lot #	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Gliuted to (mL): 1000.12 0.058 Plask Uncertainty Gliuted to (mL): 1000.12 0.058 Plask Uncertainty Pedro L. Rentas Pedro L. Rent	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Gluta to (mL): 1000.12 0.058 Pleast Uncertainty Gluta to (mL): 1000.12 0.058 Pleast Uncertainty Cerlum (Cellum (C	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Gluted to (mL): 1000.12 0.058 Pleast Uncertainty Pedro L. Rentas Pedro L. Rentas Cerlum (Ce)	Lot #	Lot #	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cug/mL): 1000 Storage: Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) (mL) Heviewed By: Pedro L. Rentas Reviewed	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cug/mL): 1000 Storage: Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) (mL) Heviewed By: Pedro L. Rentas Reviewed	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty				Manufacture Control of the Control o	Nominal Purity Uncertainty Assay Target Artius Actival Incorposition Cochanal Cochan	Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info, On Attached po.)	Lot Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Cone (100/m) (%) Purity (%) (%) Number (%) (%) Purity (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Number Conc. (Light) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (Light) (Light) (ACK.
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Lot #	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Pedro L. Rentas	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 5E-05 Balance Uncertainty Fevlewed By: Pedro L. Rentas	Lot # Lot #	Lot #	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 200523 Cerlum (Ce) Cerl	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 200523 Cerlum (Ce) Cerl	020626 Ambient (20 °C) 1000 6UTB SE-05 Batance Uncertainty Pedro L. Rentas		21.00	Expanded Expanded	Expanded	Nominal Purity Uncertainty Assay Target Artiful Actual Invocations (Column Column Colu	Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (Lightland) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (Lightland) ACTUAL) (ACTUAL)
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Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Fedro L. Rentas Fedro L. Rentas	Lot # Solvent: 21110221 Nitric Acid Centum (Ce) 2 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Batance Uncertainty Fedro L. Rentas Fedro L	Lot # Solvent: 21110221 Nitric Acid Centum (Ce) 20.0 Nitric Acid Centum (Ce) 2% 20.0 Nitric Acid Comulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2000 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Cormulated By: Lawrence Barry (mL) Cormulated By: Lawrence Barry (mL) Cormulated By: Lawrence Barry (mL) Cormulated By: Pedro L. Rentas Cormulated By: Cormulated	Lot # Solvent: 21110221 Nitric Acid Pedro L. Berias Solvent: 21110221 Nitric Acid Pedro L. Berias Solvent: 21110221 Nitric Acid Pedro L. Berias SE-05 Balance Uncertainty Pedro L. Berias Pedr	Lot #	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 Cerlum (20 °C) Lawrence Barry Cug/mL): 1000 5E-05 Balance Uncertainty Selection Selection	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 Cerlum (20 °C) Lawrence Barry Cug/mL): 1000 5E-05 Balance Uncertainty Selection Selection	020626 Ambient (20 °C) Ambient (20 °C) 1000 6UTB SE-05 Balance Uncertainty Rev/ewed BV: Pedro L. Rentas		1000.12	1000.12 0.058 Pleak Uncertainty Expanded	1000.12 0.058 Flask Uncertainty Expanded	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Artiful Actual Incorporation (School School	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Pask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (Lightm.) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (Lightm.) (20.4 mg.) CAS#
Lot # Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Barriage By: Pedro I By:	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Barriage By: Pedro Barriage Barriag	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Beviewed By: Pedro I Barries	Lot # Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry (mL) Selvence Barry (mL) Selvence Barry (mL) Selvence Barry (mL) SE-05 Balance Uncertainty Selvence Barry Selvence Uncertainty Service Selvence Uncertainty Selvence Uncertainty Selvence Uncertainty Selvence Uncertainty Selvence Barry Selvence Uncertainty Selvence Barry Selvence Uncertainty Selvence Uncertainty Selvence Uncertainty Selvence Barry Selvence Uncertainty Selvence Barry Selvence Uncertainty Selvence Barry Selvence Uncertainty Selvence Unc	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 5E-05 Balance Uncertainty Beviewed By: Pedro I Barries	Lot #	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Comber: 6.078 Second Containty Comber: 6.078 Second Containty Cerlum (Ce) Cerl	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Cerlum (Ce) Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Comber: 6.078 Second Containty Comber: 6.078 Second Containty Cerlum (Ce) Cerl	020626 Ambient (20 °C) Ambient (20 °C) 1000 6UTB SE-05 Balance Uncertainty Parking		1000.12	1000.12 0.058 Flask Uncertainty Expanded	1000.12 0.058 Plask Uncertainty Expanded	1000.12 0.058 Resk Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay, Target Artiful Actual Incorporation Column School S	1000.12 0.058 Resk Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	1000.12 0.058 Plask Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Pask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (ug/ml.) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (ug/ml.) Actual Actual Info.
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57058 Solvent: 21110221 Nitric Acid Parameter 020623 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) (mL) Ambient (20 °C) Mitric Acid Ambient (20 °C)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Min (Co) Cerlum (Ce) Cerlum (Ce)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Min (Column (Colu	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 Minute Acid Minu	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 Minute Acid Minu	020626 Ambient (20 °C) 1000		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty Per 1000.12 0.058 Flask Uncertainty Expanded	1000.12 0.058 Flask Uncertainty Expanded	1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay, Target Articl Incorporate Column SDS Information	1000.12 0.058 Flask Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached po.)	1000.12 0.058 Flask Uncertainty Assay. Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Flask Uncertainty 1000.12 0.058 Park Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000.12 0.058 Flask Uncertainty 1000.12 0.058 Plask Uncertainty Expanded SDS Information SDS Information
Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 Cerlum (Ce)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000	Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 Certum (20 °C) Ce	Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) 1000 Certum (20 °C) Ce	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 1000	Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 1000	020626 (mL) Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C)		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty Pec 1000.12 0.058 Plask Uncertainty Expanded	5E-05 Balance Uncertainty 1000.12 0.058 Fleak Uncertainty Expanded	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay Target Article Actual Incorporate Column Col	5E-05 Balance Uncertainty 1000.12 0.058 Plask Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached po.)	5E-05 Balance Uncertainty 1000.12 0.058 Plask Uncertainty Assay. Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	5E-05 Balance Uncertainty 1000.12 0.058 Plask Uncertainty Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (Lighthal.) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) (%) Weight (a) Weight (b) Conc. (Lighthal.) CAS.# Ocual Purity (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)
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Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Minus (mL) Mi	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Minus (mL) Mi	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Minus (mL) Mi	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Minus (mL) Mi	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Mind Acid Cerlum (20 °C) Mind Acid Cerlum (20 °C) Ce	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ministration Company Cerlum (20 °C) Ce	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cardum (20 °C) Cerlum (20 °C)	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cardum (20 °C) Cerlum (20 °C)	020626 Ambient (20 °C) (mL) Ambient (20 °C)		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay, Target Article Investment (School School Sc	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached on.)	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information Nominal Purity Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Some Conc. (Lighter) Conc. (Lighter
Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) (mL)	Lot # Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Company Compa	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Companies	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Control of the contr	Lot # Lot # lumber: 020623 sription: Cerlum (Ce) on Date: 020626 Storage: Ambient (20 °C) Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry (mL)	Lot # Lot # lumber: 020623 sription: Cerlum (Ce) on Date: 020626 Storage: Ambient (20 °C) Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry (mL)	020626 Ambient (20 °C) Ambient (20 °C)	The state of the s	5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Artial Artial Investors (School SpS Information	6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas 020623 Complete to (mL): 1000.12 0.058 Flask Uncertainty Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	6UTB 5E-05 Balance Uncertainty Calluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (Loch.) (44) Purity (45)	6UTB 5E-05 Balance Uncertainty Second Seco
Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Constant Constan	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Converse Conv	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Colvent Colv	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Color	Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Control of the contr	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Control of the contr	Lot # Lot # lumber: 020623 ription: Cerlum (Ce) on Date: 020626 Storage: Ambient (20 °C) Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry (mL)	Lot # Lot # lumber: 020623 ription: Cerlum (Ce) on Date: 020626 Storage: Ambient (20 °C) Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry (mL)	020626 (mL) Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C)	1	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty Feviewed By:	6UTB 5E-05 Balance Uncertainty Cilluted to (mL): 1000.12 0.058 Plask Uncertainty Article Article Investigation Column Purity Uncertainty Assay, Target Article Investigation Column Colu	6UTB 5E-05 Balance Uncertainty 6Illurad to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached on.)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	GUTB SE-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty Generality Expanded By: Pedro L. Rentas 020623 Expanded Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (µg/mL) CAS# Occurrence of Transaction Conc. (µg/mL) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (µg/mL) CAS# Occurrence of Transaction Conc.
Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Color	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Control # Cont	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Color	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Color	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Ambient (20 °C) Ambient (20 °C) Solvent: 21110221 Nitric Acid Formulated By: Lawrence Barry Formulated By: Lawrence By: Lawre	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Converse C	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry con Date: 020626 (mL) (mL) Formulated By: Lawrence Barry	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry con Date: 020626 (mL) (mL) Formulated By: Lawrence Barry	020626 (mL) Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C)		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	6UTB SE-05 Balance Uncertainty Reviewed By: Alliuted to (mL): 1000.12 0.058 Plask Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty (mL): 1000.12 0.058 Flask Uncertainty Actual Actual Invarianty Columbia Purity Uncertainty Assay, Target Actual Actual Invarianty Columbia Colu	6UTB 5E-05 Balance Uncertainty City Uncertainty Actual Actual Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached on.)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty 65 Plast Uncertainty Actual Uncertainty Conc. (uc/m) (44) Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB SE-05 Balance Uncertainty Gliluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Actual Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (ug/mL) (%) Punity (%) (%) Weight (a) Weight (b) Conc. (ug/mL) CAS# Occur
Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Color Colo	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce) Cerlum	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce) Cerlum	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce) Cerlum	Lot # Solvent: 2110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Color Col	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce) Cerlum	Lot # Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Storage: Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce)	Lot # Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Storage: Ambient (20 °C) Ambient (20 °C) Ambient (20 °C) Cerlum (Ce)	020626 (mL) Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C)		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty GILL): 1000.12 0.058 Plask Uncertainty	6UTB 5E-05 Balance Uncertainty City Country Uncertainty Assay, Target Artiful Artiful Investigated Country Country Uncertainty Assay, Target Artiful Artiful Artiful Investigated Country Country Uncertainty Assay, Target Artiful Artiful Investigated Country Uncertainty Assay, Target Artiful Artiful Investigated Country Uncertainty Assay, Target Artiful Artiful Investigated Country Country Uncertainty Assay, Target Artiful Investigated Country Country Uncertainty Assay, Target Artiful Investigated Country Country Uncertainty Assay, Target Artiful Investigated Country Uncertainty Assay, Target Artiful Investigated Country Uncertainty Assay, Target Artiful Investigated Country Coun	6UTB 5E-05 Balance Uncertainty 6Illuted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached to 1.)	1000 6UTB SE-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty Conc. (Lord Nominal Purity Uncertainty Assay Target Actual Uncertainty Conc. (Lord Nominal Purity Conc. (Lord	6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (%) Purity (%) (%) Weloft (a) Weloft (b) Conc. (up/mL) CAS# Occurrence (up/m
Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) Ambiest (20.0) (mL) Ambiest (20.0) (mL) (Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) Ambiest (20.0) (mL) Ambiest (20.0) (mL) (Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) Ambiest (20.0) (mL) Cerlum (Ce) Cerl	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) Ambiest (20.0) (mL) Ambiest (20.0) (mL) (Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) (mL) Cerlum (Ce) C	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambiest (20.0) (mL) (mL) Cerlum (Ce) C	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Commission C	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Commission C	020626 (mL) Nitric Acid Formulated By: Lawrence Barry		5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty Gilluted to (mL): 1000.12 0.058 Plask Uncertainty	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actival Activa	1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Octual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty GILLA Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (%) Purity (%) (%) Welcht (a) Welcht (b) Conc. (up/mL) CAS# Occuration (Solvent Safety Info. On Attached pg.)
Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) (mL)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) (mL)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) Cerlum (Ce) Cer	Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Construction Construction Cerlum (Ce) Cerlum	Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Construction Construction Cerlum (Ce) Cerlum	020626 (mL) Nitric Acid Formulated By: Lawrence Barry	111	5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Plask Uncertainty Expanded	6UTB SE-05 Balance Uncertainty GILL): 1000.12 0.058 Flask Uncertainty	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Artist Uncertainty Artist Uncertainty Assay Target Artist Uncertainty Artist Unce	1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1)	6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Octual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty GILUTED 1000.12 0.058 Plast Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	1000 SE-05 Balance Uncertainty SE-05 Balance Uncerta
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid (mL) Formulated By: Lawrence Barry (mL)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Lot # lumber: 020623 ription: Cerlum (Ce) on Date: 020626 (mL) Nitric Acid Formulated By: Lawrence Barry	Lot # Lot # lumber: 020623 ription: Cerlum (Ce) on Date: 020626 (mL) Nitric Acid Formulated By: Lawrence Barry	020626 (mL) Nitric Acid Formulated By: Lawrence Barry		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	6UTB 5E-05 Balance Uncertainty Expanded Expanded	6UTB 5E-05 Batance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actual	6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plank Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (ug/mL) (%) Purity (%) (%) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Weight (g) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Weight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) Meight (g) Weight (g) Conc. (ug/mL) CAS# Occurrence (g) CAS# Occurre
Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	57058 Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	200623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid ription: Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry on Date: 020626 (mL) (mL) (mL)	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid ription: Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry on Date: 020626 (mL) (mL) (mL)	020626 (mL) Nitric Acid Formulated By: Lawrence Barry		5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty idiluted to (mL): 1000.12 0.058 Pask Uncertainty	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty idiluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Actua	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Actual Uncertainty Assay Target Actual Observing (Solvent Safety Info. On Attached to 1)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (un/m) (44) Purity (45) (44) Waishe (5) (44) Waishe (54) (45) Purity (45) (44) Waishe (54) (45) Purity (45) (45) Waishe (55) (45) Waishe (56) (45) (45) (45) Waishe (56) (45) (45) (45) (45) (45) (45) (45) (45	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty RW# Number Conc. (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Conc. (µg/mL) CAS# Occurrence (µg/mL) (%) Purity (%) (%) Weldtr (a) Conc. (µg/mL) (A) CAS# Occurrence (µg/mL) (A) CAS
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	Lot # Solvent: 21110221 Nitric Acid	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	lumber: 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	lumber: 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (ml.)	020626 (mL)		0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Artial Artial Investigate Colors Supplied to (mL).	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1.)	Ambient (20 °C) 1000 6UTB 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (%) Purity (%) (%) Weldtr (b) Weldtr (b) Conc. (up/mL) CAS# Occurrence (processed on the conc. (up/mL) (processed on the conc. (up/mL
57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	lumber: 57058 Solvent: 21110221 Nitric Acid cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry on Date:	lumber: 57058 Solvent: 21110221 Nitric Acid cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry on Date:	2% 20.0 Nitric Acid Formulated By: Lawrence Barry		0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded	Ambient (20 °C) 1000 6UTB SE-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Artiful Art	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1.)	Ambient (20 °C) 1000 6UTB 5E-05 Batance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 6UTB 6UTB 6UTB 6UTB 6UTB 6UTB 6UTB 6UTB	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (96) Purity (96) (96) Welcht (p) Welcht (p) Welcht (p) Conc. (up/mL) CASE (up/mL) C
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 57058 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	lumber: 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	lumber: 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	2% 20.0 Nitric Acid Formulated By: Lawrence Barry		0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty 1000.12 0.058 Plask Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flesk Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Assay, Target Artiful Artiful Artiful Investigation	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (96) Purity (96) (96) Welcht (p) Welcht (p) Welcht (p) Conc. (up/mL) CASH (p) CA
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot # Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	2% 20.0 Nitric Acid Formulated By: Lawrence Barry		0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Pask Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty idiluted to (mL): 1000.12 0.058 Flask Uncertainty	Ambient (20 °C) 1000 6UTB 5E-05 Batence Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Actual	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Actual Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1.	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 4mbient (20 °C) 4mbient (20 °C) 6UTB 5E-05 Balance Uncertainty 6UTB Fedro L. Rentas Coc. (soft) Co	Ambient (20 °C) 4mbient (20 °C) 1000 6UTB 5E-05 Batence Uncertainty 6UTB Expanded Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/ml.) (96) Purity (96) (96) Welchit (a) Welchit (b) Conc. (up/ml.) CAS# Occurrence (up/ml.) (20 occurrence) (10 occ
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid Iumber: 020623 Inition: Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot # Iumber: Lot # Solvent: 21110221 Nitric Acid Iumber: 020623 Inition: Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	2% 20.0 Nitric Acid Formulated By: Lawrence Barry	(TE)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Resk Uncertainty Expanded	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty idiluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay, Target Artiful Art	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Actual Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Flask Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty Number Conc. (un/ml) (44) Purity (45) (44) Waishe (56) (45) Purity (45) (44) Waishe (56) (45) Purity (45) Purity (45) (45) Purity (4	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty RW# Number Conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CASE (up/mL) C
57058 Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot ≠ Iumber: Lot ≠ Solvent: 21110221 Nitric Acid ription: Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	Lot ≠ Iumber: Lot ≠ Solvent: 21110221 Nitric Acid ription: Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry	2% 20.0 Nitric Acid Formulated By: Lawrence Barry	(m)	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded	### Control of the co	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay, Target Artial Artial Investigated Column Purity Uncertainty Assay, Target Artial Artial Investigated Column Col	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 4mbient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty Actual Actual Uncertainty Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty RM# Number Conc. (norm) (44) Purity (45) (44) Waishe (5) (44) Waishe (54) (45) (45) (45) (45) (45) (45) (45)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Flask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CAS# Occurrence (pg.)
57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated Burn	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: aurence Berry	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: purpose Barre	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: surrance Barre	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Learner Barrer	57058 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated Burn	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Solven	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid Solvent: 21110221 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Formulated Burn Solvent: 20.0 Nitric Acid Solven	2% 20,0 Nitric Acid Formulated By: Laurence Berry	0 0	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information	### Article Control Co	Ambient (20 °C)	Ambient (20 °C)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty Actual Lot Nominal Purity Uncertainty Assay Target Actual Lot Nominal Purity Uncertainty Assay Target Actual Conc. (Loch.) (44) Purity (45) (44) Waishe (5) (44) Waishe (56) (45) (45) (45) (45) (45) (45) (45) (45	Ambient (20 °C) 4mbient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty 4liluted to (mL): 1000.12 0.058 Plask Uncertainty Lot Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) RM# Number Conc. (up/mL) (%) Purity (%) (%) Weldtr (a) Weldtr (b) Conc. (up/mL) CASH COLOR EN TAIN COLOR EN TAI
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) Cerlum (Ce) On Nitric Acid	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce)	57058 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) Cerlum (Ce)	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) Cerlum (Ce)	57058 57058 Solvent: 21110221 Nitric Acid Cerium (Ce) 29, 200 Nitric Acid	57058 57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 20, 20,0 Nitric Acid	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Ntric Acid Cerlum (Ce) Cerlum	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Ntric Acid Cerlum (Ce) Cerlum	29% SOO Nikdo Avid	7	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information	Ambient (20 °C) Ambient (20 °C) 1000 6UTB 5E-05 Batance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information	### Activated to (mL): 1000.12 0.058 Plast Uncertainty Activated A	## Comparing the Comparing	Ambient (20 °C) Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Columb to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Ambient (20 °C) 4mbient (20 °C) 1000 6UTB 5E-05 Baiance Uncertainty 6UTB Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Uncertainty 8DS Information Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Assay Target Actual Uncertainty Conc. (ucm) (44) Purity Uncertainty Conc.	Ambient (20 °C)
57058 Solvent: 21110221 Nitric Acid Cerlum (Ce)	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce)	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce)	57058 Solvent: 21110221 Nitric Acid 020623 Cerlum (Ce)	57058 Solvent: 21110221 Nitric Acid 020623 Cerium (Ce)	57058 Solvent: 21110221 Nitric Acid Cerium (Ce)	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Lot # Lo	Lot # Lot # Lot # Lot # Lot # Solvent: 21110221 Nitric Acid Lot # Lo	THE WOOD AND	(mL)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	(mL) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information	Ambient (20 °C) Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information	Ambient (20 °C) Ambient (20 °C) 1000 6UTB 5E-05 Batence Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Assay, Target Artigle Investigation Lot Nominal Purity Uncertainty Assay, Target Artigle Investigation	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plast Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Column Purity Uncertainty Assay Target Actual Actual Uncertainty Column	Ambient (20 °C) 4mbient (20 °C) 4mbient (20 °C) 4mbient (20 °C) 6UTB 5E-05 Baiance Uncertainty 6UTB Conc. (uc/m) (44) 6uth Conc. (uc/m) (Control of the cont
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: <u>57058</u> lumber: <u>020623</u> ription: <u>Cerlum (Ce)</u>	lumber: <u>57058</u> lumber: <u>020623</u> ription: <u>Cerlum (Ce)</u>		(mL) Ninn Acid Formulated By: Lawrence Barry	0 °C) (mL) (mL) SE-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	(mL) (mL) (mL) (mL) (mL) (mL) (mL) (mL)	Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Idiluted to (mL): 1000.12 0.058 Plask Uncertainty Lawrence Barry 020623 Reviewed By: Lawrence Barry 020623 Reviewed By: Pedro L. Rentas 020623 Expanded SBS Information Lot Nominal Purity Uncertainty Assay, Target Artiful Artiful Investigated Colored	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached to 1)	020626 Ambient (20 °C) 1000 GUTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty Canada Ambient (20 °C) Reviewed By: Pedro L. Rentas 020623 Reviewed By: Pedro L. Rentas 020623 Expanded SDS Information Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Computation	Complete Barry Content Con
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: <u>57058</u> lumber: <u>020623</u> ription: <u>Cerlum (Ce)</u>	lumber: <u>57058</u> lumber: <u>020623</u> ription: <u>Cerlum (Ce)</u>	ē	(mL) Nitric Acid Formulated By: Lawrence Barry	0 °C) (mL) (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded S20.0 Nifric Acid Formulated By: Lawrence Barry (mL) Reviewed By: Pedro L. Rentas	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Carmulated By: Lawrence Barry Reviewed By: Pedro L. Rentas Expanded SDS Information	### Completed By: Lawrence Barry 020623 [mL] Artist Color Formulated By: Lawrence Barry 020623 ###################################	C20626	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty Camulated By: Lawrence Barry 020623 Formulated By: Lawrence Barry 020623 Reviewed By: Pedro L. Rentas 020623 Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Complete Bury Control of Cont	Complete Barry Control Complete Barry Control Complete Barry Control Con
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	ē	20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) (mL) (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SOS Information Solution	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information	Complete Barry Comp	C20626	C20626 Ambient (20 °C)	Complete Continuity Continu	Complete Barry Continuity
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	ō	20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) Formulated By: (mL) (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SOS Information Formulated By: Lawrence Barry Reviewed By: Pedro L. Rentas	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Pleast Uncertainty Expanded SDS Information SDS Information	Complete By: Lawrence Barry Concess Complete By: Lawrence Barry Concess Conc	C20626	C20626	Complete By: Lawrence Barry Concess Complete By: Lawrence Barry Concess Conc	Complete Barry Continuity
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	5E-05 Balance Uncertainty SE-05 Resk Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SOS Information Expanded SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.056 Plask Uncertainty Expanded SDS Information SDS Information	Complete Barry Comp	Complete	2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Complete	Formulated By: Lawrence Barry 020623 CmL
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	5705 <u>8</u> 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)	lumber: 57058 lumber: 020623 ription: Cerlum (Ce)		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information Expanded SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information SOS Information	2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 (mL) (mL) (mL) (mL) (mL) (mL) (mL) (mL)	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Formulated By: Lawrence Barry 020623 Reviewed By: Pedro L. Rentas 020623 Expanded SDS Information Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Composition Continuous Co	2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 (mL) (mL) (mL) (mL) (mL) (mL) (mL) (mL)
57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)	57058 020623 Cerlum (Ce)		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty	0 °C) SE-05 Belance Uncertainty Tool.12 0.058 Flask Uncertainty Expanded SDS Information Expanded SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information S2% 20.0 Nitric Acid Formulated By: Lawrence Barry Reviewed By: Pedro L. Rentas	020626 Ambient (20 °C) 4mbient (20 °C) 4mbient (20 °C) 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 6UTB 5E-05 Balance Uncertainty 6UTB 6UTB 6UTB 6UTB 700623 Fewanded 8DS Information 10th Nominal Purity Uncertainty Assay, Target Artial Artial Investigation	2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Ambient (20 °C) 1000 1000 6UTB 5E-05 Balance Uncertainty Actual Actua	Compared to (mL): 1000.12 Conception C	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Cut Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty Rewiewed By: Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Conc. (up/mL) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) (96) Weight (9) Cache Conc. (up/mL) (96) Purity (96) Purity (96) (96) Purity (96) (96) Purity (96) (96) Purity (96) (
57058 020623 Coding (Co)	57058 020623 Coding (Ca)	57058 020623 Coding (7a)	57058 020623 Certing (Ce)	57058 020623 Continu (Co.)	57058 020623 Codium (Co)	57058 020623 Coding (Co)	57058 020623 Coding (Co)		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) SE-05 Balance Uncertainty Tool.12 0.058 Flask Uncertainty Expanded SDS Information Expanded SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information S2% 20.0 Nitric Acid Formulated By: Lawrence Barry Reviewed By: Pedro L. Rentas	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Flask Uncertainty Assay, Target Artial Artial Investigated State Control Columbia Columbia Purity Uncertainty Assay, Target Artial Artial Investigated Columbia Colum	020626 Ambient (20 °C) 1000 6UTB 5E-05 Batence Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Assay. Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	020626 Ambient (20 °C) 1000 GUTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Formulated By: Lawrence Barry 020623 Reviewed By: Pedro L Rentas 020623 Expanded SDS Information Expanded Solvent Safety Info. On Attached pg.)	2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 (mL) 1000 6UTB 5E-05 Balance Uncertainty Actual Actual Uncertainty Conc. (Lord Nominal Purity Uncertainty Assay Target Actual Uncertainty (Solvent Safety Info. On Attached pg.)	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Actual Actual Actual Actual Uncertainty RW# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (a) Weight (a) Weight (b) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (µg/mL) CASE (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (b) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Weight (a) Conc. (µg/mL) CASE (µg/mL) (%) Purity (%) (%) Weight (a) Conc. (µg/mL) CASE (µg/mL) (µg/m
57058 020623	57058 020623	57058 020623	57058 020623	57058 020623	57058 020623	57058 020623	57058 020623		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	0 °C) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	0 °C) SE-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information Solution SDS Information	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty diluted to (mL): 1000.12 0.058 Plask Uncertainty Expanded SDS Information S2% 20.0 Nitric Acid Formulated By: Lawrence Barry Reviewed By: Pedro L. Rentas Expanded SDS Information	SE-05 Balance Uncertainty SE-05 Balance Uncertainty SE-05 Balance Uncertainty Article	SE-05 Balance Uncertainty Assay Target Actual Act	C20626	Complete Control Con	Complete
57058 020623	5705 <u>8</u> 020623	57058 020623	57058 020623	57058 020623	57058 020623	57058 020623	57058 020623		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	2% 20.0 Nitric Acid Formulated By: (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) (mL) (mL) Reviewed By: Pedro L. Rentas Expanded SDS Information SDS Information	020626 Ambient (20 °C) 4mbient (20 °C) 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Pleast Uncertainty Expanded SDS Information SDS Information	Section (Ce) Control of Contr	C20626	C20626	SE-05 Balance Uncertainty Section Sectio	Complete
57058 020623	57058 020623	57058 020623	5705 <u>8</u> 020623	5705 <u>8</u> 020623	57058 020623	57058 020623	57058 020623		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	2% 20.0 Nitric Acid Formulated By: (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty	SE-05 Balance Uncertainty 5E-05 Resk Uncertainty 1000.12 0.058 Fesk Uncertainty Expanded SOS Information Expanded SOS Information	Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020626 Ambient (20 °C) (mL) (mL) Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas Reviewed By: Pedro L. Rentas 6UTB 5E-05 Plast Uncertainty Expanded SDS Information	Centum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Centum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Complete	Continuity Con
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<u>57058</u>	57058 Sances	57058	57058	<u>57058</u>	57058	57058 Dances	57058 Dances		20.0 Nitric Acid Formulated By: Lawrence Barry (mL)	2% 20.0 Nitric Acid Formulated By: (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) (mL) (mL) SE-05 Balance Uncertainty 1000:12 0.058 Flesk Uncertainty Expanded SDS Information Expanded SDS Information	Cerlum (Ce) 2% 20.0 Nitric Acid Ambient (20 °C) 4mbient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty dilluted to (mL): 1000.12 0.058 Plast Uncertainty Expanded SDS Information Expanded SDS Information	Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 1000 1000 5E-05 Balance Uncertainty Expanded SE-05 Balance Uncertainty Expanded SE-05 Balance Uncertainty Artist Location Location Lawrence Barry 020623 1000	Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Ambient (20 °C) (mL) (mL) (mL) Reviewed By: Pedro L Rentas 020623 6UTB 5E-05 Balance Uncertainty Fast Uncertainty Reviewed By: Pedro L Rentas 020623 ettpanded SDS Information Expanded SDS Information Lot Nominal Purity Uncertainty Assay Target Actual Actual Actual Actual Actual Actual Actual Actual Actual On Attached po.)	Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Ambient (20 °C) (mL) (mL) Reviewed By: Pedro L Rentas 020623 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L Rentas 020623 eUTB 5E-05 Balance Uncertainty Actual Actual Actual Actual Actual On Attached pg.)	Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623
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46	3		2						Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid Formulated By: (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry (mL) (mL) (mL) (mL) (mL) (mL) (mL) (mL)	57058 Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) 4mbient (20 °C) (mL) Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas dilluted to (mL): 1000.12 0.056 Plast Uncertainty Expanded SDS Information	Solvent: 21110221 Nitric Acid Formulated By: Lawrence Barry O20623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Purity Uncertainty Assay Target Nitric Acid Solvent: 21110221 Nitric Acid Formulated By: Lawrence Barry 020623 Cerlum (20 °C) 1000 6UTB 5E-05 Balance Uncertainty SE-05 Balance Uncertainty Secure Color Solvent Safety Info. On Attached po.) Expanded Solvent Safety Info. On Attached po.) Expanded Solvent Safety Info. On Attached po.) 1000 10	57058 Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry 020623 Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020628 Ambient (20 °C) 1000 (mL) (mL) Reviewed By: Lawrence Barry 020623 6UTB 5E-05 Balance Uncertainty Fask Uncertainty Reviewed By: Pedro L. Rentas 020623 diluted to (mL): 1000.12 0.058 Flask Uncertainty Actual Actual Actual Copyright (Solvent Safety Info. On Attached pg.)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce) Cerlum (Cerlum (Cerlum) (C	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)
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72	2	1)	1						Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty Revlewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information	57058 Solvent: 2110221 Nitric Acid Pedro L. Rentas Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) 4mbient (20 °C) (mL) Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas 6UTB 5E-05 Plast Uncertainty Reviewed By: Pedro L. Rentas 6UTB 5E-05 Plast Uncertainty Expanded SDS Information	Solvent: 21110221 Nitric Acid Formulated By: Lawrence Barry O20623	Solvent: 21110221 Nitric Acid Purity Uncertainty Assay Target Actual	Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry 020623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry Decicol Control Contr
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty Revlewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Feak Uncertainty Expanded SDS Information	57058 Solvent: 2110221 Nitric Acid Pedro L. Rentas Cerlum (Ce) 2% 20.0 Nitric Acid Podro L. Rentas 020626 Ambient (20 °C) (mL) Investigating Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Pedro L. Rentas Pedro L. Rentas 6UTB 5E-05 Plask Uncertainty Pedro L. Rentas 6UTB 5E-05 Plask Uncertainty Pedro L. Rentas	Solvent: 2110221 Nitric Acid Pormulated By: Lawrence Barry O20623	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry D20623 Cerlum (Ce) Cerlum (Ce)	Solvent: 2110221 Nitric Acid Pormulated By: Lawrence Barry D20623 D	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry D20623 Cerium (Ce)
	190	777	7						Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty Revlewed By: Revlewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Feak Uncertainty Expanded Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry (mL) Formulated By: Lawrence Barry Reviewed By: Pedro L Rentas Expanded SDS Information	57058 Solvent: 21110221 Nitric Acid Pedro L. Rentas Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Ambient (20 °C) 4mbient (20 °C) (mL) Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas Pedro L. Rentas 6UTB 5E-05 Presk Uncertainty Expanded SDS Information	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry 020623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Purity Uncertainty Assay Target Actual Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached po.)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Decical Columbiant (20 °C)	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry 020623	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry D20623
)	5					Formulated By: Lawrence Barry	Solvent: 21110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry (mL) (mL) SE-05 Balance Uncertainty (mL) SE-05 Resk Uncertainty Expanded SDS Information Expanded SDS Information	Solvent: 21110221 Nitric Acid Permulated By: Lawrence Barry (mL) Selection Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Color 1000 6UTB Selection Se	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry 020623	Solvent: 21110221 Nitric Acid Purity Uncertainty Assay Target Actual Uncertainty Assay Target Actual Actual Uncertainty Actual Actual Uncertainty Solvent Safety Info. On Attached po.)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Decical Columbiant (20 °C) Nitric Acid Pormulated By: Lawrence Barry Decical Columbiant (20 °C) O.058 Plast Uncertainty Assay Target Actual Actual Uncertainty Safety Info. On Attached pg.)	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry 020623	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry D20623
		•		5	5				Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty	Solvent: 21110221 Nitric Acid 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flask Uncertainty Expanded SDS Information	57058 Solvent: 2110221 Nitric Acid Pormulated By: Lawrence Barry 020623 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020626 Ambient (20 °C) (mL) (mL) Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas 6UTB 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry 020623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 21110221	Solvent: 2110221 Nitric Acid Pormulated By: Lawrence Barry D20623	Solvent: 2111021 Nitric Acid Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Cerium (Ce) 1000 6UTB 5E-05 Balance Uncertainty SE-05 Balance Uncertainty SE-0
									Formulated By: Lawrence Barry	Solvent: 21110221 Nitric Acid 2	Solvent: 21110221 Nitric Acid 2	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry (mL) 1000 5E-05 Balance Uncertainty Expanded SDS Information Expanded SDS Information	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry 020623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Deciral Column (Column (Col	Certum (Ce) Solvent: 21110221 Nitric Acid Certum (Ce) Certum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623	Solvent: 21110221 Nitric Acid Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623
									Formulated By: Lawrence Barry	Solvent: 21110221 Nitric Acid 2	Solvent: 21110221 Nitric Acid 2	Lot # Lawrence Barry	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry 020623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry D20623 Cerlum (Ce)	Solvent: 21110221 Nitric Acid Pormulated By: Lawrence Barry Deciral Column (Ce) Certium (Ce)	Solvent: 21110221 Nitric Acid Certium (Ce)	Lot # Lot # Lot # Lot # Lot # Low
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty Revlewed By: Revlewed By:	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry (mL) (mL) (mL) SE-05 Balance Uncertainty (mL) SE-05 Resk Uncertainty Expanded SDS Information Expanded SDS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Color C	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry Dedro L Rentas D20623 Cerium (Ce)	Lot # Solvent: 2110221 Nitric Acid Cerlum (Ce)	Lot # Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry D20623 Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry D20623 Cerium (Ce) 1000 Cerium (Ce) 1000 Cerium (Ce) Cerium	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry D20623 Cerlum (Ce)	Lot # Solvent: 21110221 Nitric Acid Formulated By: Lawrence Barry D20623 Cerlum (Ce)
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty Lot # Solvent: 2110221 Nitric Acid (mL) Formulated By: (mL) Reviewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry Formulated By: Lawrence Barry Reviewed By: Pedro L Rentas Expanded SDS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Expanded SDS Information Expanded SDS Information	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry O20623	Lot # Solvent: 21110221 Nitric Acid Centum (Ce)	Lot # Solvent: 2110221 Nitric Acid Purity Uncertainty Assay Target Actual Actual Condition Condi	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry 020623	Lot # Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (So) Purity (St) (St) Welch (c) Weith (c) Conc. (Luc/ma) C
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Firsk Uncertainty Lot # Solvent: 2110221 Nitric Acid (mL) Formulated By: (mL) Reviewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry Formulated By: Lawrence Barry Reviewed By: Pedro L Rentas Expanded SDS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Expanded SDS Information Expanded SDS Information	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry O20623	Lot # Solvent: 21110221 Nitric Acid Centum (Ce)	Lot # Solvent: 2110221 Nitric Acid Purity Uncertainty Assay Target Actual Actual Condition Condi	Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry 020623	Lot # Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (So) Purity (St) (St) Welch (c) Weith (c) Conc. (Luc/ma) C
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry Formulated By: Lawrence Barry Reviewed By: Pedro L Rentas Expanded SDS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cerlum (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Color Col	Lot # Solvent: 2110221 Nitric Acid Cerium (Ce)	Lot #	Lot # Solvent: 2110221 Nitric Acid Purity Uncertainty Assay Target Actual Actual Conduity Cond	Lot #	Lot # Number Conc. (Jug/mL) (36) Purity (16) (36) Purity (
									Formulated By: Lawrence Barry	Solvent: 2110221 Nitric Acid 2	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry Formulated By: Lawrence Barry Reviewed By: Pedro L Rentas Expanded SDS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry Cerlum (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Color Col	Lot # Solvent: 2110221 Nitric Acid Cerium (Ce)	Lot #	Lot # Solvent: 2110221 Nitric Acid Purity Uncertainty Assay Target Actual Actual Conduity Cond	Lot #	Lot # Number Conc. (Jug/mL) (36) Purity (16) (36) Purity (
									Formulated By: Lawrence Barry	Solvent: 21110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty Reviewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information Expanded SOS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Expanded SDS Information Expanded SDS Information Expanded SDS Information	Lot # Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry D20623 Cerlum (Ce)	Lot #	Lot # Solvent: 2110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Cerlum (Co) 1000 SE-05 Balance Uncertainty SE-05 Balance Uncertainty Assay Target Actual Actual Actual Uncertainty Assay Target Actual Actual Uncertainty Solvent Safety Info. On Attached pg.)	Lot #	Lot # Number Conc. (Jug/mL) 360
									Formulated By: Lawrence Barry	Solvent: 21110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Figsk Uncertainty Reviewed By:	Solvent: 2110221 Nitric Acid 2% 20.0 Nitric Acid (mL) 5E-05 Balance Uncertainty 1000.12 0.058 Flesk Uncertainty Expanded SDS Information Expanded SOS Information	Lot # Solvent: 21110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry (mL) 1000 6UTB 5E-05 Balance Uncertainty Expanded SDS Information Expanded SDS Information Expanded SDS Information	Lot # Solvent: 2110221 Nitric Acid Formulated By: Lawrence Barry D20623 Cerlum (Ce)	Lot #	Lot # Solvent: 2110221 Nitric Acid Cerlum (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Cerlum (Co) 1000 SE-05 Balance Uncertainty SE-05 Balance Uncertainty Assay Target Actual Actual Actual Uncertainty Assay Target Actual Actual Uncertainty Solvent Safety Info. On Attached pg.)	Lot #	Lot # Number Conc. (Jug/mL) 360
Solvent: 21110221 Nitric Acid Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 Cerium (Ce) 2% 20.0 Nitric Acid Formulated By: Lawrence Barry 020623 1000 6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Actual Actual Cohent Safety Info. On Attached pg.) Expanded Solvent Safety Info. On Attached pg.)	Solvent: 21110221 Nitric Acid Purity Uncertainty Assay Target Actual Actual Actual Cohest Cohes	Solvent: 2110221 Nitric Acid Permulated By: Lawrence Barry D20623	Lot Nominal Purity Uncertainty Assay Target Actual Act	Solvent: 21110221 Nitric Acid Purty Uncertainty Assay Target Actual Colored Bury Colored	Solvent: 2110221 Nitric Acid Purty Uncertainty Assay Target Actual Uncertainty Cohenge Cohen	Lot # Nominal Purty Uncertainty Assay Target Actual Lot # Nominal Purty Uncertainty Assay Target Actual Uncertainty Certual	Lot # Nominal Purty Uncertainty Assay Target Actual Lot # Nominal Purty Uncertainty Assay Target Actual Uncertainty Certual	020626 Ambient (20 °C) 1000 6UTB 5E-05 Balance Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) Expanded SDS Information SDS Information Calculation (Solvent Safety Info. On Attached pg.)	Target Actual Actual Uncertainty	Target Actual Actual Uncertainty	woming rung uncertainty Assay, larget Actual Uncertainty (Solvent Safety Info. On Attached pg.)	Minutes Convenie Delice Int. Oil Attended Pg.)	Minister Const Control of the Contro	Ministrate Come (in fact) And the Case Come of the Case C			

Compound	RM#	Lot Number	Nominal Conc. (vg/mL)	Purity (%)	Purity Uncertainty Assay (%) Purity (%) (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Actual Uncertainty Weight (g) Conc. (ug/mt.) +/- (ug/mt.)	Uncertainty +/- (ug/mL)	SS	(Solvent Safety Info. On Attached pg.) CAS# OSHA PEL (TWA) LD50	ched pg.) LD50	NIST
Cerium nitrate hexahydrate (Ce)	IN146	IN146 Z512CEB1	1000	88.98	0.10	32.8	3.04919	3.04921 1000.0	1000.0	20	II ==	¥	ď Z	ĄN
[1] Spectrum N	lo.1 [43.472	\$ sec]:58158.D#	[1] Spectrum No.1 [43.472 sec]:58158.D# [Count] [Linear]											$\ \cdot \ $
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5.088														
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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

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

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Physical Characterization:

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

(T)= Target analyte

My J. M.

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.

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

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

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

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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number:

Certified Reference Material CRM

7 20 23

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

Lot #

Solvent: 20510011 Nitric Acid

2%

40.0 (<u>l</u>

Nitric Acid

Formulated By:

Giovanni Esposito

011623

Pedro L. Rentas

011623

Giovannie

Jacob P

Description: Aluminum (AI)

011623 58113

Expiration Date: 011626

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

Weight shown below was diluted to (mL): **NIST Test Number:** 6UTB 2000.02 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By:

Compound ₽ ¥ Number ξ Conc. (µg/mL) Nominal 10000 99.999 Purity Uncertainty Assay 38 Purity (%) 0.10 7.30 8 273.9779 Weight (g) Target 274.0078 Weight (g) Conc. (µg/mL) Actual 10001.1 Actual +/- (µg/mL) Uncertainty Expanded 20.0 7784-27-2 CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information LD50 NIST SRM

1. Aluminum nitrate nonahydrate (Al) IN022 ALM112021A1 m/z-> m/z-> m/z-> 1.0 € 6 2.0 € 6 2.5E6 5.0E6 2.5E5 5.0E5 [1] Spectrum No.1 210 110 0 220 120 20 [15.014 sec]:58113.D# [Count] [Linear] 230 130 30 240 140 40 250 150 50 260 160 60 170 0 180 80 190 90 2 mg/m3 200 100 ori-rat 3671 mg/kg 3101a

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						

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

						Trace Me	tals	Verificat	ioi	by ICP-N	MS ($(\mu g/m\Gamma)$		r				
SHEW SHEET	STATE OF THE PARTY OF				SIGNATURE .	STON SAFETY SAGE	S. Parlie	THE SHARE SHARE	Series .		Sec.	STREET, STREET	THE PERSON	THE PERSON NAMED IN	THE PERSON			
707	ප	<0.02	δ	40.05	H	<0.02	II.	<0.02	Z	<0.02	ď	<0.02	Se	<0.2	13	<0.02	≥	<0.02
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07	ඊ	40.02	超	<0.02	Я	<0.02	Mg	40.01	ő	<0.02	쥪	<0.02	Ag	<0.02	F	<0.02	>	<0.02
707	ర	<0.02	පි	<0.02	片	<0.02	Mn	<0.02	Z	<0.02	2	<0.02	ž	<0.2	Ę	<0.02	¥9	40.02
100	Ö	<0.02	ජි	40.02	Ŗ	<0.2	Hg	40.2	م	<0.02	æ	<0.02	స	<0.02	Ę,	<0.02	¥	₹0.05
707	රි	40.02	පි	₹0.02	3	₹0.02	Wo	<0.02	五	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	2	₹0.02
707	ਰੋ	<0.02	Αū	<0.02	2	<0.02	PN	<0.02	×	40.2	S	<0.02	Ta	<0.02	Ξ	<0.02	Z	40.02
	6.00 6.00 6.00 6.00 6.00 6.00		3 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Cd	Cd	Cd	Cd	Cd	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ca T En -0.02 Ho -0.02 Li -0.02 Ce -0.02 Eu -0.02 in -0.02 Mg -0.02 Cr -0.02 Gd -0.02 Fe -0.02 Mn -0.02 Co -0.02 Ge -0.02 Fe -0.02 Mo -0.02 Cu -0.02 Au -0.02 Fe -0.02 Mo -0.02	Cd -60.02 Dy -60.02 Hf -60.02 Li -60.02 Ni Ca T En -60.02 Ho -60.02 Lu -60.02 Nh Ca -60.02 Eu -60.02 In -60.02 Mn -60.02 Pd Cr -60.02 Ga -60.02 Fe -60.2 Hg -60.2 Pr Co -60.02 Ga -60.02 La -60.02 Rr -60.02 Rr Cu -60.02 Au -60.02 Pr -60.02 Rr	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Ca T En -6.002 Ho -6.002 Lu -6.002 Nh -6.002 Ce -6.002 Eu -6.002 In -6.002 Mg -6.012 Nh -6.002 Cr -6.002 Gd -6.002 Fe -6.02 Mn -6.02 Pd -6.02 Cr -6.002 Gg -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Cu -6.002 Au -6.002 In -6.002 R -6.002 Cu -6.002 Au -6.002 Ph -6.002 R -6.002	Cd -6.002 Dy -6.002 Hf -6.002 Li -6.002 Ni -6.002 Pr Ca T Ea -6.002 Ho -6.002 Lu -6.002 Nb -6.002 Rc Ce -6.002 Eu -6.002 Ir -6.002 Mn -6.002 Rb -6.002 Rb Cr -6.002 Ga -6.002 Fe -6.02 Hg -6.02 Pr -6.02 Ru Co -6.002 Ga -6.002 La -6.002 Rr -6.002 Rr Co -6.002 Ga -6.002 Pr -6.002 Rr -6.002 Rr Cu -6.002 Au -6.002 Pr -6.002 Rr -6.002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Ca T Ba -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Ce -0.02 Bu -0.02 Ir -0.02 Mg -0.01 Os -0.02 Rb -0.02 Cr -0.02 Ga -0.02 Mn -0.02 Pr -0.02 Rb -0.02 Cr -0.02 Ga -0.02 Hg -0.22 Pr -0.02 Ru -0.02 Cr -0.02 Ga -0.02 Hg -0.02 Pr -0.02 Ru -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02 Cu -0.02 Au -0.02 Nd -0.02 Rr -0.02	Cd -d002 Dy -d002 Hf -d002 Li -d002 Ni -d002 Re -d002 Si Ca T Ea -d002 Ho -d002 Lu -d002 Nb -d002 Re -d002 Si Ca -d002 Ea -d002 Hr -d002 Mn -d002 Rh -d002 Na Cr -d002 Ga -d002 Hg -d02 Pr -d002 Ru -d002 Na Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Co -d002 Ga -d002 Hg -d002 Rr -d002 Sr -d002 Sr Cu -d002 Au -d002 Nd -d002 Rr -d002 Sr -d002 Sr -d002 Sr	Cd -0.02 Dy -0.02 Hf -0.02 Li -0.02 Ni -0.02 Pr -0.02 Se -0.02 Ca T Eu -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Rb -0.02 Si -0.02 Ce -0.02 Eu -0.02 In -0.02 Mn -0.02 Rb -0.02 Na -0.02 Cr -0.02 Ga -0.02 Ir -0.02 Hg -0.02 Ru -0.02 Na -0.02 Cr -0.02 Ga -0.02 Hg -0.02 Ru -0.02 Sr -0.02 Cr -0.02 Ga -0.02 Hg -0.02 Rr -0.02 Sr -0.02 Cr -0.02 Fr -0.02 Nr -0.02 Rr -0.02 Sr -0.02 Cr -0.02 Fr -0.02 Rr -0.02 Sr	Cd 4002 Dy 4002 H 4002 Li 4002 Ni 4002 Pr 4002 Se 402 Th Ca T Ea 4002 Ha 4002 Lu 4002 Nb 4002 Rb 4002 Tr Ca 4002 Eu 4002 Ha 4002 Pd 4002 Rb 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Ru 4002 Tr Cr 4002 Ga 4002 Hg 402 Pr 4002 Sr 4002 Tr Cr 4002 Au 4002 Rr 4002 Rr 4002 Sr 4002 Sr 4002 Cu 4002 Au 4002 Rr 4002 Rr 4002

(T) = Target analyte

Physical Characterization:

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



Certified by:

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

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

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

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

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

2.0% 40.0 Nitric Acid

(III)

Formulated By:

Lawrence Barry

060523

060523

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

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

P20

TSIN SRM

3112a

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

m/z->	N 5 10	5.0E5	5.0E5	m/z->	5000	1.004
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260		160		0		
		170		70		
		380		8 2.		
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		190		90		
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

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(I)= larget analyte

Physical Characterization:

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

Certified by:

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Certified Reference Material CRM

M5697



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CERTIFIED WEIGHT REPORT:

Part Number:

58029

Lot Number:

102523

Description:

Expiration Date:

NIST Test Number:

Copper (Cu)

Ambient (20 °C)

2.0%

Lot #

24002546

40.0

Nitric Acid Formulated By:

(mL)

Solvent:

Nitric Acid

Reviewed By:

Expanded

+/- (µg/mL)

Pedro L. Rentas 102523

Recommended Storage: Nominal Concentration (µg/mL):

1000

102526

6UTB

5E-05 Balance Uncertainty

Volume shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

Final Uncertainty

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

NIST

3114

Compound

Part Number Number

Dilution Factor

Initial

Uncertainty

Nominal Pipette (mL) Conc. (µg/mL)

1000

Initial Conc. (µg/mL) Conc. (µg/mL)

OSHA PEL (TWA)

Benson Chan

LD50 SRM

102523

1. Copper(II) nitrate trihydrate (Cu)

58129

10

110

100223

20

120

Lot

0.1000

200.0

0.084

10000.1

1000.0

2.2

10031-43-3

CAS#

1 mg/m3 ori-rat 794 mg/kg

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



 $m/z \rightarrow$

5.0E7

2.5E7

m/z->

2.0E7

1.0E7

m/z-> 210 130

30

140

150

50

160

60

170

70

180

80

190

90

200

100

220 230 240 250

260

Part # 58029

Lot # 102523

1 of 2

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

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

0.5			DOM: NO.				Trace M	etals	Verifica	tion	by ICP-M	S (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Тъ	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	ΰ	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	п	<0.02	v	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	< 0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Ве	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	T	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Та	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

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

Certified by:

Box 1. 8/1

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ırt # 58029

Lot # 102523

2 of 2

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Certified Reference Material CRM

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

Lot#

24002546

CERTIFIED WEIGHT REPORT:

Part Number:

58025

102623

Lot Number: Description:

Manganese (Mn)

Ambient (20 °C)

2.0%

60.0

Nitric Acid

(mL)

Solvent:

Nitric Acid

Reviewed By:

Expanded

Formulated By:

102623

102623

Expiration Date: Recommended Storage:

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

6UTB

102626

Balance Uncertainty 5E-05

Volume shown below was diluted to (mL):

3000.41

0.058 Flask Uncertainty

Lot

Dilution

Initial Uncertainty Initial

Uncertainty

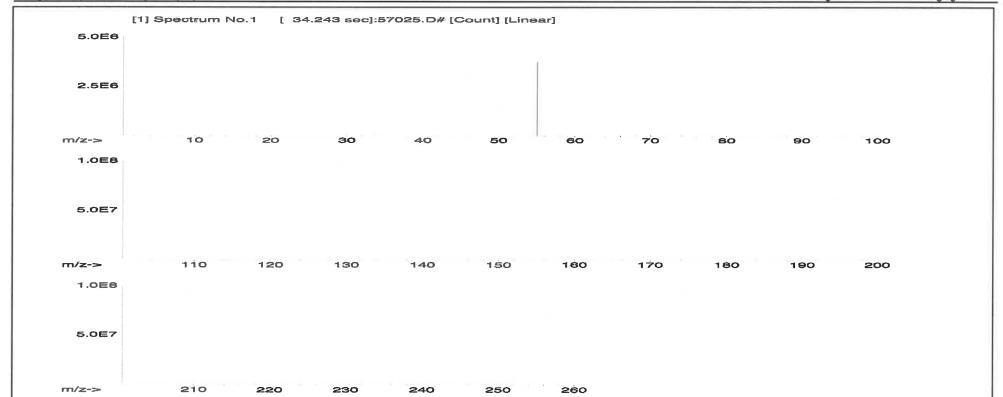
(Solvent Safety Info. On Attached pg.)

SDS Information

Pedro L. Rentas

Benson Chan

Part Nominal Final NIST Compound Number Vol. (mL) Pipette (mL) Conc. (µg/mL) CAS# OSHA PEL (TWA) LD50 Number Factor Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) SRM 1. Manganese(II) nitrate tetrahydrate (Mn) 58125 071123 0.1000 300.0 0.084 1000 10000.1 1000.0 2.1 20694-39-7 5 mg/m3 orl-rat >300mg/kg 3132





Certified Reference Material CRM



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

							Trace M	etals	Verifica	tion	by ICP-M	IS (µ	g/mL)						
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Ть	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	T1	<0.02	l v	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir,	<0.02	Mn	T	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	< 0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

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CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:** Description:

57082 100923 Lead (Pb)



Certified Reference Material CRM

MSTHT

R: 12/20/23

Lot #

Solvent: 24002546 Nitric Acid

2% 60.0 Nitric Acid

1000 Ambient (20 °C)

Recommended Storage:

Expiration Date:

100926

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number: BTU9** 3000.41 0.06 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By:

Lot

Nominal

Purity

Uncertainty Assay

PV# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SRM

Formulated By: Lawrence Barry 100923

Target Actual Actual		SDS Information
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	#[Cou	62.5
	nti [Line	4.80071
		4.80077
		1000.0
		2.0
		10099-74-8
		0.05 mg/m3
		intryns-rat 93 mg/kg
		3128

m/z->	1.0E6	₽.OE	m/z->	5.0E4	1.0∈5	m/z->	5.0M4	1.0E5
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Physical Characterization:

(1)= Target analyte

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

Certified by:

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

the preparation of all standards.

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



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





800-368-1131

Absolute Standards, Inc.

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

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Physical Characterization:

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

Certified by:

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



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

CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 маровгозата Compound Nominal Concentration (µg/mL): m/z-> ~-z/m m/z-> Weight shown below was diluted to (mL): Recommended Storage: 2.0≡4 1.0E4 5.0E5 1.0E6 1000 2000 NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 210 0 쭕 **BTUB** 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):

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(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.
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Certified Reference Material CRM



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

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

24002546 Nitric Acid

2.0% (IE)

Nominal Concentration (µg/mL):

NIST Test Number:

BTU₉ 1000

Volume shown below was diluted to (mL):

2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Recommended Storage:

Ambient (20 °C) 102526

Expiration Date:

Lot Number: Description:

Beryllium (Be)

40.0

Nitric Acid

Benson Chan

102523

Formulated By:

Reviewed By:

Pedro L. Rentas 102523

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





800-368-1131



Certified Reference Material CRM

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

							Trace M	etals	Verificat	cation	by ICP-M	(J) S	ua/mL)						
	TATES AND AND		District Color	STATE OF THE PERSON		Section and		SOMETHINGS.	NAME OF STREET	SAMOOGE STATE	SECOND SPINSO	No. of Concession, Name of Street, or other Persons and Street, or other P	. 18						
F	<0.02	3	<0.02	Ďλ	<0.02	HL	<0.02	Li	<0.02	z	<0.02	Ā	<0.02	Se	<0.2	T.	<0.02	M	<0.02
Sp	<0.02	ථ	40.2	占	₹0.02	He	<0.02	3	<0.02	£	<0.02	Re	<0.02	Š	<0.02	ę	₹0.02	Þ	<0.02
As	<0.7	ඊ	<0.02	립	₩	ដ	€0.02	Mg	10.0>	ő	<0.02	Rh	<0.02	Ag	<0.02	F	<0.02	>	40.02
Ba	<0.02	ర	<0.02	3	<0.02	ㅂ	<0.02	Mn	<0.02	2	<0.02	8	<0.02	ž	40.2	Ħ	<0.02	2	<0.02
æ	Т	Ç	40.02	ő	40.02	£	<0.7	Hg	<02	Δ,	<0.02	Ru	<0.02	š	<0.02	Tm	₹0.02	×	40.02
洒	<0.02	රි	<0.02	ප	<0.02	ឌ	40.02	Mo	<0.02	武	<0.02	Sm	<0.02	S	<0.02	S	<0.02	2	<0.02
æ	<0.02	ರೆ	<0.02	Au	<0.02	£	₹0.02	PK	<0.02	M	<0.2	S	40.02	Ta	<0.02	F	<0.02	Z	40.02

(T) = Target analyte

Physical Characterization:

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

Certified by:



All standard containers are meticulously cleaned prior to use.

2 of 2

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

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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):

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(I) = larget analyte

Physical Characterization:

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

Certified by:

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Certified Reference Material CRM

R: 02109124





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

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

1.0E6	5.0E5	m/z->	5.0E7	1.0E8	5.0E7
				F	
		.0		0	
		0		120	
L 34-243 Secj.baok7.D# [Count] [Linear]		Ō		130	
		.0		140	
		.09		150	
		. O		160	
				170	
		02			
		80		160	
		00		180	
		100		200	

Lot # 091923

250

240

230

220

010

W/Z->

Certified Reference Material CRM





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

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

							Trace M	etals	Verifical	tion	by ICP-M	4S (F	ig/mL)						
1							STREET, STREET	No section lives	ALL DESCRIPTION OF THE PERSON	10.000	Market Mark	MINNSH.	Sandara American	NAME OF TAXABLE PARTY.	Service of the last	SECOND STATES		THE PERSON NAMED IN	STREET, SQUARE,
IV	<0.02	ಶ	1	Š	40.02 Dy 40.02	Ħ	<0.02	П	<0.02	Z	<0.02	Æ	<0.02	8	<0.2	£	<0.02	A	<0.02
ౙ	40.02	రే	40 7	占	<0.02	H9	<0.02	.3	₹005	Ź	₹0.02	2	<0.02	Š	40.02	T _e	40.05	ם	40.02
As	Q 5	ප	40.02	呂	40.02	ų	<0.02	Mg	10.05	ő	₹0.02	됩	<0.02	Ag	40.02	F	<0.02	>	Ø.02
쯃	40.02	చ	40.02	3	4002	ㅂ	<0.02	Ma	<0.02	콘	₹000	2	40.02	N _a	40.2	Ę	20:0>	Ŗ	Ø.02
2	¥0.01	ඊ	20.0 2	త్ర	40.02	હ	40.2	쁀	\$ 20	تم	₹0.02	콥	40.02	Şt	40.02	Tm	Ø.02	7	Ø.02
遥	40.02	රි	۳	Ğ,	4002	ដ	<0.02	Mo	40.02	Æ	20'0 >	S	<0.02	S	40.02	Sn	40.02	Zn	Ø.02
æ	<0.02	ට්	<0.02	Αn	<0.02	윤	Z0'0>	P	<0.02	м	40.2	S	₹0.02	Fee	40,02	Ħ	Ø.02	72	Ø.02

(T)= Target analyte

Physical Characterization:

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



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Lot # 091923

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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

-z/x->	500	m/z->	N IN IN	m/z-> 5.0≣4	1.0厘5	≥.005
						3
Ŋ		110		ō		[] Speatrum No.1
						Z 0.1
N N N O		120		N.		á
230		130		3 0		[34.433 sec]:57033.D# [Count] [Linear]
		A second		er West A best		90]:570
240		140		ò		33.D#
N 0		-i-		50		[Count]
Ö		0		0		[Lines
N O		160		0.0		ā
		170		70		
		180		80		
		-		The state of the s		
		190		90		
		N				
		200		100		

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

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	₹ ७८८ = = ⊅		
	6000 6000 6000 6000		
	322428		
	40.02 40.02 40.02 40.02 40.02	Trace N	
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	Z Z Y Z < C &		
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Physical Characterization:

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

Certified by:



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

Solvent: MKBQ8597V Ammonium hydroxide

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

CERTIFIED WEIGHT REPORT: R - 02 00 124 M.5814

Part Number: Lot Number: 57005 071123

Description: Boron (B)

Nominal Concentration (µg/mL): Recommended Storage: 1000 Ambient (20 °C)

Expiration Date:

071126

2.0%

Ammonium hydroxide

Formulated By:

Benson Chan

071123

tento

40.0

Weight shown below was diluted to (mL): 1999.48 0.058 Flask Uncertainty

RM#

Number

Purity (%)

3

NIST Test Number: Ĕ Nominal Purity 5E-05 Balance Uncertainty Uncertainty Assay Target Actual Reviewed By: Expanded Pedro L. Rentas **SDS Information**

071123

1. Boric acid (B) IN018 BV092016A1 Conc. (µg/mL) 9 8 0.10 17.3 11.55772 Weight (g) 11.56201 1000.4 120 10043-35-3 2 mg/m3 orl-rat 2660 mg/kg 3107

Actual +/- (µg/mL) Uncertainty CAS# (Solvent Safety Info. On Attached pg.)
OSHA PEL (TWA) LD50 OSHA PEL (TWA)

NIST SRM

Weight (g) Conc. (µg/mL)

[1] Spectrum No.1 [12.275 sec]:58105.D# [Count] [Linear]

17/Z-V <-Z/111 m/z-> 2.5EG 5.0E6 2.5E6 S.OE6 1.0E4 2.0≡4 110 1210 0 120 220 Ŋ 130 230 30 140 240 40 150 250 (I) O 200 160 60 170 70

180

190

200

80

90

100

Part # 57005

Printed: 2/8/2024, 5:01:07 PM

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

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

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Physical Characterization:

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

Certified by:

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Certified Reference Material CRM

R102109124

MURIC

Solvent: 21110221

Nitric Acid

Lot #

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

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:**

57115 041723

Description:

Phosphorous (P)

Expiration Date:

041726

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

BTUB

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.02

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

1. Ammonium dihydrogen phosphate (P)

IN008 PV082019A1

10000

99,999

0.10

27.5

RM#

Compound

22%

40.0

Nitric Acid

Formulated By:

Lawrence Barry

041723

into

Reviewed By:

Pedro L. Rentas

Expanded SDS Information 041723

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

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

Part # 57115

1 of 2

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

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(I)= larget analyte

Physical Characterization:

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

Certified by:

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2 of 2

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R1 02/09/124 Certified Reference Material CRM

M5816

CERTIFIED WEIGHT REPORT

Part Number:

Lot Number: Description:

57016 122923

Solvent:

122923

ASTM Type 1 Water

Lot #

Expiration Date: 122926 Sulfur (S)

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

Recommended Storage:

Ambient (20 °C)

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

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

Reviewed By:

Pedro L. Rentas

122923

tento

Formulated By:

Benson Chan

122923

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

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

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.

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Certified Reference Material CRM

199124

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

Formulated By:

Lawrence Barry

071123

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): Ĕ 1999.48 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas

Purity

Uncertainty Assay

Target

Actual

 Ammonium sulfate (S) IN117 SLBR7225V Number Conc. (µg/mL 10000 99,9 3 Purity (%) 0.10 24.3 8 Weight (g) 82.4675 Weight (g) 82,4682 Conc. (µg/mL) 10000.1 20.0 7783-20-2 S orl-rat 4250mg/kg 3 81

Actual Uncertainty Expanded

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

+/- (µg/ml OSHA PEL (TWA) TSIN SRM

m/z->	1000	2000
10		[1] Spectrum No.1 [24.004 sec]:58116.D# [Count] [Linear]
20		Vo. 1 [24
30		.004 sec];5
46		8116,D#[C
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70		
80		
90		
100		

m/z->

210

220

230

240

1250 0

260

m/z->

10

100

130

140

150

160

170

180

190

200

2.0≣5

1.0E5

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

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Physical Characterization:

(1)= larger analyte

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

Certified by:

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Part # 57116

Lot # 071123

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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

Compound

RM#

Number 5

Conc. (µg/ml.)

8

3

Weight (g)

Weight (g) Conc. (µg/ml.)

Nominal

Purity

Uncertainty Assay Purity (%)

Target

Actual

Actual

Uncertainty

CAS#

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

SRM SRM

SDS Information

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) m/z-> m/z-> 1.058 1.0E@-5.0E7 2.0E8 5.0E4 [1] Spectrum No.1 [31.103 sec]:58130.D# [Count] [Linear] 10 10 IN016 ZNE032021A1 120 20 1 000 130 30 99.999 0.10 140 40 24.3 12.3475 150 50 12.3502 60 60 1000.2 170 70 +/- (µg/mL) 2.0 180 80 10196-18-6 OSHA PEL (TWA) 190 90 200 100 orl-rat 1190mg/kg 3168

m/2->

210

220

230

240

250

260

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

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(i) = larget analyte

Physical Characterization:

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

Certified by:

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Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT:

Lot #

Nitric Acid

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

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

(JE)

Nitric Acid

Formulated By:

Lawrence Barry

091123

Pedro L. Rentas

091123

SDS information

rento

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 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



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

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

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Physical Characterization:

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

Certified by:

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



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

ACCREDITATION / REGISTRATION 1.0

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



2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGY10

Lot Number:

V2-Y740548

Matrix:

2% (v/v) HNO3

Value / Analyte(s):

10 000 µg/mL ea:

Yttrium

Starting Material:

Yttrium Oxide

Starting Material Lot#:

2661 and 06230520YL

Starting Material Purity:

99.9984%

CERTIFIED VALUES AND UNCERTAINTIES 3.0

Certified Value:

 $10000 \pm 30 \mu g/mL$

Density:

1.032 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1

10011 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #2

9997 ± 50 µg/mL

ICP Assay NIST SRM 3167a Lot Number: 190730

Assay Method #3

9984 ± 31 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

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

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

Characterization of CRM/RM by Two or More Methods

Certified Value, X_{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 uchar i

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

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

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

k = coverage factor = 2

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

u_{bb} = bottle to bottle homogeneity standard uncertainty

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

uts = transport stability standard uncertainty

- ------

Characterization of CRM/RM by One Method
Gertified Value, Xanuary, where one method of characterizat

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

XCDM/DM = (Xa) (Uchar a)

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u^2_{char} a + u^2_{bb} + u^2_{lts} + u^2_{ts})^{V_2}$

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

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)

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

M	Ag	<	0.004600	М	Eu		0.009037	M	Na		0.086360	M	Se	<	0.005200	M	Zn		0.030125
M	Al		0.014862	0	Fe		0.002410	М	Nb	<	0.000570	0	Si		0.024100	0	Zr	<	0.002600
М	As	<	0.003500	М	Ga	<	0.000570	M	Nd		0.000923	M	Sm		0.000461				
М	Au	<	0.001700	М	Gd	<	0.003500	M	Ni	<	0.005700	М	Sn	<	0.002300				
0	В		0.002209	M	Ge	<	0.005200	M	Os	<	0.001200	M	Sr	<	0.004600				
0	Ва	<	0.002500	М	Hf	<	0.000570	n	Р	<		M	Ta	<	0.000570				
0	Be	<	0.001400	М	Hg	<	0.000570	M	Pb		0.005020	M	Tb		0.001044				
M	Bi	<	0.003500	М	Но		0.009037	М	Pd	<	0.005100	М	Te	<	0.002300				
0	Ca		0.009841	М	In	<	0.002300	М	Pr	<	0.002300	М	Th	<	0.000570				
М	Cd	<	0.000570	М	lr	<	0.000570	М	Pt	<	0.000570	М	Ti	<	0.003500				
M	Ce	<	0.002300	0	K		0.018677	М	Rb	<	0.000570	М	TI	<	0.000570				
M	Co	<	0.000570	M	La		0.000461	М	Re	<	0.000570	М	Tm	<	0.003500				
M	Cr	<	0.004000	0	Li	<	0.009300	М	Rh	<	0.008000	M	U	<	0.000570				
M	Cs	<	0.000570	M	Lu		0.000582	М	Ru	<	0.000570	M	٧		0.001265				
М	Сп		0.002610	0	Mg		0.001486	n	S	<		М	W	<	0.002300				
М	Dy		0.003815	M	Mn		0.000582	М	Sb		0.005422	s	Υ	<					
М	Er		0.003615	М	Мо	<	0.005700	М	Sc	<	0.001200	M	Yb		0.001827				

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

chemically stable for years in 2-5% HNO3 / LDPE container.

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

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

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

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

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 89 amu	0.8 ppt	N/A	73Ge16O, 178Hf+2
ICP-OES 360.073 nm	0.005 / 0.000036 μg/mL	1	Ce, Th
ICP-OES 371.030 nm	0.004 / 0.00007 µg/mL	1	Се
ICP-OES 377.433 nm	0.005 / 0.0009 µg/mL	1	Ta, Th

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 20, 2024

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

11.2 Lot Expiration Date

- February 20, 2029
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

_	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 Custom Processing Supervisor

Mayyand Man Paul R. Laine

Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

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	2.064	1. Selenium (Se)	Compound	Volume sho	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	
		NOO		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

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

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

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

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

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Certified Reference Material CRM

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

Part # 57003 Lot # 062124

1 of 2

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Certified Reference Material CRM



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

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

40.02 40.01	40.2 40.02	40.02	40.2		<0.02	40.02				
8 ជ ជ	ರ ಜ	cs		င့	C	6	2	l		
20.02	3	<0.02	<0.02	<0.02	<0.2	20.02	9			
	င့	Ga	6	Eu	략	Ly		l		
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步	Ľ	Fe	ㅂ	Ħ	Но		H.	١		
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×	77	Ъ	Pd	Os	NO	ř	Z.	۱	tion k	١
<0.2	<0.02	<0.02	<0.02	20.02	20.02	3	<0.02		y ICP-M	١
Sc	Sm	Ru	Kb	2 3	1 2	D.,	Pr		en) s	۱
<0.02	<0.02	<0.02	<0.02	0.02	0.00	9	<0.02			١
Ta	00	, g	Na	Ng.		2	Sc	١		١
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E	1 1	B	1	1 :	3 :	-	Тъ			I
20.02	\$0.0Z	40.02	6.05	0.02	200	<0.02	<0.02			
E	2 1	7 -	< ?	∳ .	<	d	W			
20,02	20.02	40.02	20.00	3 8	20.02	<0.02	<0.02			

(T) = Target analyte

Physical Characterization:

Al Sh As Ba Ba Bi

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

Certified by:

	Puri	굺
	Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in	certifi
	ids,	ed v
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	풀	con
	dei	cen
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	zed	tio
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	ca	ate
	ğ	<u>d</u>
	ate	rom
	G	gra
	sse	MINE
	Þ	- EE
	gla	2
	WSS	ano
	are	V
	an	ŭ
	d	ec
	ne	5
	ngr	1100
	lest	ž
	þ	0
	J	: 5
	ra	2
	8	d
	nac	00
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	are	0
	USU	000
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	3	

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

* Standards are prepared gravimetrically using balances that are calibrated.

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

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

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

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Part # 57003 Lot # 062124

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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 property of the property

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

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

Page 2 of 4

INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

> uR M 882000.0

> 9A M 886 0.000.0

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

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

> iN O 882000.0 > aO M 841200.0

> dN O 322500.0 > N M 862000.0

M - Checked by ICP-MS

Mn < Mg < Li <

> 0H

> 6H

ΉŁ

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

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

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

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

> 6T M 882000.0 > AT M 882000.0

sT M 034450.0 > dT M E70100.0

s 852000.0 M 882000.0

O.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 0.004577 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 Columbiant of the contract of the Columbiant of the Colu

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.	Idoseones	
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-Vool (no				
(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-0ES 336.121 nm	
ла, Та, Сг, U М М9 Ω-	1 1		Mote: This start and F	II-
W, Mo, Co		In/gy 4500000 \ cocos-	nous prepries entre shou	•

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



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

M5985 R:6/14/24

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGIN10

Lot Number:

U2-IN729349

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 000 μg/mL ea:

Indium

Starting Material:

Indium Metal

Starting Material Lot#:

2511

Starting Material Purity:

99.9995%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:

 $10022 \pm 30 \mu g/mL$

Density:

1.044 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1

10021 ± 56 µg/mL

ICP Assay NIST SRM 3124a Lot Number: 110516

Assay Method #2

10035 ± 25 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #3

10001 ± 33 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

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

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

Characterization of CRM/RM by Two or More Methods

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

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

X_i = mean of Assay Method i with standard uncertainty uchar i

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

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

uts = transport stability standard uncertainty

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

Characterization of CRM/RM by One Method

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

k = coverage factor = 2

u_{char a} = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

М	Ag	<	0.000760	М	Eu	<	0.000760	0	Na		0.012771	M	Se	<	0.023000	М	Zn	<	0.006100
М	Al		0.003385	0	Fe		0.004462	М	Nb	<	0.000760	0	Si		0.024619	М	Zr	<	0.000760
М	As	<	0.004600	М	Ga	<	0.000760	М	Nd	<	0.000760	М	Sm	<	0.000760				
М	Au	<	0.002300	М	Gd	<	0.000760	0	Ni	<	0.005100	М	Sn	<	0.000760				
0	В		0.003692	М	Ge	<	0.001600	М	Os	<	0.000760	0	Sr	<	0.000610				
М	Ba	<	0.001600	M	Hf	<	0.000760	n	Р	<		М	Ta	<	0.000760				
0	Be	<	0.000130	M	Hg	<	0.003100	M	Pb		0.001400	М	Tb	<	0.000760				
M	Bi	<	0.000760	М	Но	<	0.000760	М	Pd	<	0.001600	М	Te	<	0.000760				
0	Ca		0.004616	8	In	<		М	Pr	<	0.000760	М	Th	<	0.000760				
M	Cd	<	0.000760	М	lr	<	0.000760	M	Pt	<	0.000760	0	π	<	0.001100				
М	Ce	<	0.000760	0	K		0.007078	М	Rb	<	0.000760	М	TI	<	0.000760				
М	Co	<	0.000760	М	La	<	0.000760	М	Re	<	0.000760	М	Tm	<	0.000760				
0	Сг	<	0.001300	0	Li	<	0.000130	М	Rh	<	0.000760	М	U	<	0.000760				
М	Cs	<	0.000760	M	Lu	<	0.000760	М	Ru	<	0.000760	М	٧	<	0.001600				
М	Cu	<	0.003800	0	Mg		0.000707	n	S	<		М	W	<	0.001600				
М	Dy	<	0.000760	0	Mn		0.000149	M	Sb	<	0.000760	М	Υ	<	0.000760				
М	Er	<	0.000760	М	Мо	<	0.002300	М	Sc	<	0.000760	M	Yb	<	0.000760				

n - Not Checked For s - Solution Standard Element

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

i - Spectral Interference

INTENDED USE 6.0

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

In Containing Samples (Preparation and Solution) -Metal (Best dissolved in HCl / HNO3); Oxide (Soluble in mineral acids); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Sulfuric/peroxide digestion or dry ash and dissolution in dilute HCl).

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

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 115 amu	1 ppt	n/a	115Sn, 99Ru16O
ICP-OES 158.583 nm	0.05 / 0.002 μg/mL	1	
ICP-OES 230.606 nm	0.1 / 0.03 μg/mL	1	Ni, Os
ICP-OES 325.609 nm	0.2 / 0.05 μg/mL	1	Mn, Mo, Th

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 21, 2023

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

0 I TOT D 0	na Datas	
- Sealed TCT Bag Ope	en Date:	

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director 20178hi



300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

Certificate of Analysis

M6074

M6075 M6076 M6077

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

EXP. 9/6/2029

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code:

Multi Analyte Custom Grade Solution

Catalog Number:

CHEM-CLP-4

Lot Number:

V2-MEB746762

Matrix:

3% (v/v) HNO3

3% (v/v) HF

Value / Analyte(s):

1 000 µg/mL ea:

Boron,

Molybdenum,

Silicon,

Tin,

Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE Boron, B **CERTIFIED VALUE**

ANALYTE Molybdenum, Mo **CERTIFIED VALUE**

1 000 ± 5 μg/mL

Silicon, Si

1 000 ± 5 µg/mL

Tin, Sn

1 000 ± 5 µg/mL

Titanium, Ti

1 000 ± 7 μg/mL

1 000 I 5 pg/mL

1 000 ± 6 µg/mL

Density:

1.033 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-SI702546
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	traceable to 3162a	T2-TI725816

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

INTENDED USE 6.0

- 6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.
- 6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. https://www.inorganicventures.com/terms-and-conditions-sale. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669,6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 06, 2024

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

11.2 Lot Expiration Date

- September 06, 2029
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

 Sealed TCT 	Bag Open Date:	

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

Paul R Sains

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns Custom VS Manager

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

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





R->16/13/24 Met dig

M 6/21

Material No.: 9530-33 Batch No.: 0000275677 Manufactured Date: 2020/12/16 Retest Date: 2025/12/15

Revision No: 1

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
ACS - Specific Gravity at 60°/60°F	1.185 – 1.192	1.190
ACS – Bromide (Br)	<= 0.005 %	< 0.005
ACS - Extractable Organic Substances	<= 5 ppm	1
ACS - Free Chlorine (as Cl2)	<= 0.5 ppm	< 0.5
Phosphate (PO ₄)	<= 0.05 ppm	< 0.03
Sulfate (SO ₄)	<= 0.5 ppm	< 0.3
Sulfite (SO ₃)	<= 0.8 ppm	0.3
Ammonium (NH ₄)	<= 3 ppm	< 1
Trace Impurities – Arsenic (As)	<= 0.010 ppm	< 0.003
Trace Impurities - Aluminum (Al)	<= 10.0 ppb	< 0.2
Arsenic and Antimony (as As)	<= 5 ppb	< 3
Trace Impurities – Barium (Ba)	<= 1.0 ppb	< 0.2
Trace Impurities – Beryllium (Be)	<= 1.0 ppb	< 0.2
Trace Impurities – Bismuth (Bi)	<= 10.0 ppb	< 1.0
Trace Impurities – Boron (B)	<= 20.0 ppb	< 5.0
Frace Impurities – Cadmium (Cd)	<= 1.0 ppb	< 0.3
Frace Impurities – Calcium (Ca)	<= 50.0 ppb	29.7
race Impurities – Chromium (Cr)	<= 1.0 ppb	< 0.4
race Impurities – Cobalt (Co)	<= 1.0 ppb	< 0.4
race Impurities – Copper (Cu)	<= 1.0 ppb	< 0.1
race Impurities – Gallium (Ga)	<= 1.0 ppb	< 0.2

Material No.: 9530-33 Batch No.: 0000275677

Test	Specification	Result
Trace Impurities - Germanium (Ge)	<= 3.0 ppb	< 2.0
Trace Impurities - Gold (Au)	<= 4.0 ppb	< 0.2
Heavy Metals (as Pb)	<= 100 ppb	< 50
Trace Impurities – Iron (Fe)	<= 15.0 ppb	<1
Trace Impurities – Lead (Pb)	<= 1.0 ppb	< 0.5
Trace Impurities – Lithium (Li)	<= 1.0 ppb	0.2
Trace Impurities – Magnesium (Mg)	<= 10.0 ppb	0.4
Trace Impurities – Manganese (Mn)	<= 1.0 ppb	< 0.4
Trace Impurities – Mercury (Hg)	<= 0.5 ppb	0.1
Trace Impurities – Molybdenum (Mo)	<= 10.0 ppb	< 5.0
Trace Impurities – Nickel (Ni)	<= 4.0 ppb	< 0.3
Trace Impurities – Niobium (Nb)	<= 1.0 ppb	< 0.2
Frace Impurities – Potassium (K)	<= 9.0 ppb	< 2.0
Frace Impurities - Selenium (Se), For Information Only	ppb	1.0
Trace Impurities - Silicon (Si)	<= 100.0 ppb	< 10.0
race Impurities – Silver (Ag)	<= 1.0 ppb	< 0.3
race Impurities – Sodium (Na)	<= 100.0 ppb	< 5.0
race Impurities – Strontium (Sr)	<= 1.0 ppb	< 0.2
race Impurities – Tantalum (Ta)	<= 1.0 ppb	< 0.9
race Impurities – Thallium (TI)	<= 5.0 ppb	< 2.0
race Impurities – Tin (Sn)	<= 5.0 ppb	< 0.8
race Impurities - Titanium (Ti)	<= 1.0 ppb	0.8
race Impurities – Vanadium (V)	<= 1.0 ppb	< 0.2
race Impurities – Zinc (Zn)	<= 5.0 ppb	
race Impurities – Zirconium (Zr)	<= 1.0 ppb	0.3 < 0.1

For Laboratory, Research or Manufacturing Use Product Information (not specifications): Appearance (clear, fuming liquid) Meets ACS Specifications

Country of Origin:

US

Packaging Site:

Phillipsburg Mfg Ctr & DC







R -> 11/12/24

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

Manufactured Date: 2024-03-26

Retest Date: 2029-03-25

Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (HNO3)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	1 ppm
Chloride (CI)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (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	2.3 ppb
Trace Impurities - Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities - Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities - Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	100 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities - Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities - Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>

Nitric Acid 69% CMOS





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

Test Specification Result

For Microelectronic Use

Country of Origin: USA

Packaging Site: Phillipsburg Mfg Ctr & DC

Cloak

Director Quality Operations, Bioscience Production



Certified Reference Material CRM



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

m/z->	1.0 m 4	1000	m/z-> 2000	6.0E6	1.0E8	Compound RM# Number 1. Magnesium nitrate hexahydrate (Mg) IN030 маровгогдал	Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	Expiration Date:	Par Lo
N 10			ō		[1] Spectrum No.1	nydrate (Mg)	NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Expiration Date: nended Storage:	Part Number: Lot Number: Description:
					3 Z 0	RIM# Nu NO30 MGD0	10000 6UTB diluted to (mi	112 Ami	112 Ma
	Ñ	· - -	20			- 11		112127 Ambient (20 °C)	58112 112124 Magnesium
ļ. 	130		30		9.923	Nominal Conc. (µg/mL) 10000	2000.07	0	IPM TO
					ec];581	(%) (%) Purity (5E-05 B	9	5
	4		A •		*	Uncertainty Purity (%) 0.10	5E-05 Balance Uncertainty 0.100 Flask Uncertainty		10 x 1/13/250 Nont:
			70		Count	Assay (%) v	ainty ity	2%	vent: 2
	150		50			Target Weight (g) 234.9183		40.0 (mL)	24012496
	100		G .		.j [6	Actual Weight (g)		Nitric Acid	Nitric Acid
	170		70		- 11	Actual Conc. (µg/mL)		-	bid.
					No.	Uncertainty +/- (µg/mL)	Reviewed By:	Formulated By:	32
	80		8 .		10-8	CAS	By:	M By	iovanni
	190		0		3	vent	Pedro L. Rentas SDS Inform		e Esta
	NO 0		1 0.		on-rai	o. On Attachec	ro L. Remas SDS Information	osito	ato a
					on-rat 5440 mg/kg 3131a	рд.) Ш50	112124	112124	

Part # 58112

1 of 2

www.absolutestandards.com

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

В	Ď	7	E C	Ва	Às	Sb	Αl			
<0.02	20.05	3	0.01	<0.02	402	<0.02	<0.02			
Cu	5	3	유	స	ဂ္ဂ	C2	Cd			
<0.02	70.02	3	40.02	<0.02	40.02	0.2	<0.02			
Au	ç	9	ලු	足	멸	탁	Dy			
<0.02	10.01	3	<0.02	<0.02	40.02	<0.02	<0.02			
Pb	į	-	77	Ϊ́	In	Но	Hf		١.	l
<0.02	10:01	3	40.2	<0.02	<0.02	<0.02	40.02		Trace Mo	
Nd		5	Hg	Mn	Mg	Ē	Ε.		etals	
<0.02	0 00	400	40.2	<0.02	Н	<0.02	<0.02		Verifica	
7	; ;	¥	Ъ	Pd	ô	B	Z	ı	tion	
70	3	A).02	<0.02	<0.02	40.02	<0.02	△ 0.02		oy ICP-N	
oc.	2	Sm	Ru	Rb	Rh	Ke	, <u>z</u>		15 (1)	,
70.05	3	∆ .02	<0.02	<0.02	40.02	20.02	0.02		g/mL)	, ,
165	,]	(A)	Sr	N	Ag	. S	8	,		
20.02	3	<0.02	<0.02	40.2	20.02	20.02	9 6			
Ŀ	:1	Sh	Tm	15	1 =	1 5	7 10		l	
10:02	3	40.02	40.02	20.02	20.02	50.02	20.02	3		
	7,	Zn	×	10	\$ <	4 0	≒ ≉	W		
10.00	200	40.02	40.02	20.02	0.02	200	3 6	3		

(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).

Part # 58112

2 of 2

www.absolutestandards.com

Part Number:

Lot Number:



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

CERTIFIED WEIGHT REPORT:

Formulated By: Diovannie Giovanni Esposito 2 Septe 101124

Pedro L. Rentas

101124

Recommended Storage: **Expiration Date:** Description: 101124

Manganese (Mn)

Ambient (20 °°)

Manganese (20 °°) 1000

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number:** ETUB ត្ត 4000.2 Nominal 0.10 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Reviewed By: Uncertainty Expanded (Solvent Safety Info. On Attached pg.)

RM#

Number

Conc. (µg/mL)

8

Purity (%)

8

Weight (g)

Weight (g) Conc. (µg/ml.)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM NIST T SDS Information

 Manganese(II) nitrate hydrate (Mn) IN031 MNM082020A1 1000 99.999 0.10 20.8 19.2322 19.2344 1000.1 2. 0 15710-66-4 5 mg/m3 orl-rat >300mg/kg 3132

m/z->	5.0E7	1.0E8	5.0E7	1.0E8	7-2/2	N UI	5. OE6
							[1] 88
0		110			0		[1] Spectrum No.1
			•				NO.1
N N O		120			0		و
230		100			30		1.243
ō		Ō					ec]:57(
N 40		140			40		[34.243 sec]:57025.D# [Count] [Linear]
							Coun
N D		150			6		t] [Line
N O		300			0		2
J		J					
		170			70		
		-			Ó		
		0			80		
		90			0		
		N 0	on.		100		



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

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

Г							Trace Me	etals	Verifica	tion	by ICP-	SM	(µg/mL)						
2	∆ 0.02	8	40.02	Dγ	40.02	H	<0.02		<0.02	Z	<0.02	P	<0.02	Se	40.2	41	<0.02	×	A0,02
dS	<0.02	ರೌ	40.2	뎍	<0.02	Н	<0.02	Ę	40.02	Z	40.02	Re	<0.02	ž.	40.02	Te	<0.02	c	40.02
As	<0.2	င္ပ	<0.02	핃	<0.02	In	<0.02	Mg	40.01	0°	<0.02	굦	<0.02	A	8,02	1	<0.02	<	<0.02
Ba	40.02	ဂ္ဂ	40.02	හි	<0.02	Ħ	40.02	Mn	H	꾿	40.02	공	40.02	Z.	40,2	금	<0.02	⋨	♦0.02
Ве	40.01	턴	40.02	ନ୍ଥ	40.02	7.	40.2	He	40.2	P	40.02	R	40.02	Sr	A).02	Tm	<0.02	×	< 0.02
Bi	0.02	ဝ	∆ 0.02	ନ୍ମ	40.02	La	<0.02	Mo	40.02	7	40.02	Sm	<0.02	S	A.02	Sn	<0.02	Zn	\$0.02
В	<0.02	Cu	<0.02	Au	<0.02	РЬ	<0.02	Nd	<0.02	*	<0.2	Sc	<0.02	I)	40.02	크	<0.02	Zr	<0.02
									}										

(T) = Target analyte

Physical Characterization:

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

Certified by:

Jon T. Mills

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



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

M6137

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGSI1

Lot Number:

V2-SI744713

Matrix:

tr. HNO3

tr. HF

Value / Analyte(s):

1 000 µg/mL ea:

Silicon

Starting Material:

Silica

Starting Material Lot#:

1771

Starting Material Purity:

99.9981%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:

999 ± 6 µg/mL

Density:

1.003 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1

999 ± 5 µg/mL

ICP Assay NIST SRM Traceable to 3150 Lot Number: S2-Si702546

Assay Method #2

1000 ± 7 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

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

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

Characterization of CRM/RM by Two or More Methods

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

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

 $\mathbf{X_i}$ = mean of Assay Method \mathbf{i} with standard uncertainty \mathbf{u}_{char} \mathbf{i} \mathbf{w}_{i} = the weighting factors for each method calculated using the inverse square of the variance:

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

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

k = coverage factor = 2

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

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X, = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

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

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

6.0 **INTENDED USE**

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

Atomic Welght; Valence; Coordination Number; Chemical Form in Solution - 28.09 +4 6 Si(OH)x(F)y2-Chemical Compatibility -Soluble in HCl, HF, H3PO4 H2SO4 and HNO3 as the Si(OH)x(F)y2-. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated. Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ∼100 ppm in water) in all dilute acids

Stability - 2-100 ppb levels - stability unknown - (alone or mixed with all other metals) as the Si(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Si(OH)x(F)y2- chemically stable for years in 2-5 % HNO3 / trace HF in a LDPE container.

Si Containing Samples (Preparation and Solution) -Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - SiO2, amorphic (dissolve by heating in 1:1:1 H2O / HF / HNO3); Oxide - quartz (fuse in Pt0 with Na2CO3); Geological Samples(fuse in Pt0with Na2CO3 followed by HCI solution of the fuseate); Organic Matrices containing silicates and non volatile silicon compounds (dry ash at 4500C in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse / ash with Na2CO3 and dissolve fuseate with HCI / H2O); Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-1000C to "unzip" the Si- O-Si polymeric structure or digest with conc. H2SO4 / H2O2 followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the K2+Si(CH3)2O= salt which is not volatile at room temperature.

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

	•		
Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 28 amu	4000 - 8000 ppt	N/A	N2, 12C16O
ICP-OES 212.412 nm	0.02/0.01 µg/mL	1	Hf, Os, Mo, Ta
ICP-OES 251.611 nm	0.012/0.003 µg/mL	1	Ta, U, Zn, Th
ICP-OES 288.158 nm	0.03/0.004 µg/mL	1	Ta, Ce, Cr, Cd, Th

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

QUALITY STANDARD DOCUMENTATION 10.0

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 10, 2024

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

11.2 Lot Expiration Date

- July 10, 2029
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 Certificate Prepared By:

Uyen Truong Custom Processing Supervisor

Mayyand Man
Paul R. Laine

Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

www.absolutestandards.com



Certified Reference Material CRM



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

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

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

1 of 2

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

В	<u>00</u>	Be	Ba	As	Sb	≥			
<0.02	<0.02	<0.01	<0.02	40.2	<0.02	<0.02			
5	င္ပ	Ω	င္တ	දි	C ₂	S			
<0.02	<0.02	<0.02	40.02	<0.02	602	<0.02			
Au	င္ပ	ଦ୍ଧ	<u>ਨ</u>	Eu	ম্র	Ų			
<0.02	<0.02	<0.02	△0.02	<0.02	40.02	40.02	STATE OF STREET		
Pb	La	Fe	F	In	Но	Нf			
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Z	Mo	Hg	Mn	Mg	L	Ш		etals	
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×	7	۵	Pd	0°	3	Z.		tion	
40.2	40.02	0.02	A.02	40,02	40.02	40.02		by ICP-N	
Se	Sm	Ru	Rb	Rh	Re	P		S (III	
<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		a/mL)	
Ta	S	Sr	Z	Ag	S:	&			
40,02	40.02	40,02	-7	<0.02	<0.02	<0.2			
	Sn	Tm	H	⊒	Te	4	i		I
40,02	40.02	<0.02	<0.02	<0.02	△0.02	<0.02			
127	Zn	Y	44	<	C	W			
20.02	40.02	40.02	<0.02	<0.02	<0.02	<0.02	III O O O O		

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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

All standard containers are meticulously cleaned prior to use.

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

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

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

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

Part # 58111



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

R: 4/20/21

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

* M6150

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

APPLICATION:

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

CAUTION:

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

the analyses.

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

> Safety Data Sheets Available Upon Request

(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

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

Page 1 of 2











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)₈, 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-					

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M6156

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R > 6/12/24

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CERTIFIED WEIGHT REPORT: Lot # Solvent: Part Number: 57042 MKBQ8597V Ammonium hydroxide Lot Number: 032123 Description: Molybdenum (Mo) 0.5% 15.0 Formulated By: Lawrence Barry 032123 Ammonium hydroxide **Expiration Date:** 032126 (mL) **Recommended Storage:** Ambient (20 °C) Nominal Concentration (µg/mL): 1000 **NIST Test Number: 6UTB** 5E-05 Balance Uncertainty Reviewed By: Pedro L. Rentas 032123 Volume shown below was diluted to (mL): 3000.41 0.058 Flask Uncertainty **SDS Information** Expanded Part Lot Dilution Initial Uncertainty Nominal Initial Final Uncertainty (Solvent Safety Info. On Attached pg.) NIST Compound Vol. (mL) Pipette (mL) Conc. (µg/mL) CAS# OSHA PEL (TWA) . Number Number Factor Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) SRM 1. Ammonium molybdate (Mo) 58142 1000.0 112322 0.1000 300.0 0.084 1000 10001.4 5 mg(Mo)/m3 2.1 13106-76-8 orl-rat 333 mg/kg 3134 [1] Spectrum No.1 [8.594 sec]:57042.D# [Count] [Linear] 2.0E5 1.0E5 m/z->10 20 30 40 50 60 70 80 90 100 2000 1000 m/z->110 120 130 140 150 160 170 180 190 200 2.0E6 1.0E6 $m/z \rightarrow$ 210 220 230 240 250 260



Certified Reference Material CRM



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

	Trace Metals Verification by ICP-MS (µg/mL)																		
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Но	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	< 0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	< 0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	< 0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	< 0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	< 0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	T	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	< 0.02	Zn	<0.02
В	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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CERTIFIED 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):

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Physical Characterization:

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

Certified by:

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CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: 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
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Part # 57051



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

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(1) = Target analyte

Physical Characterization:

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

Certified by:

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Part # 57051

Lot # 120523

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Certified Reference Material CRM

M6030

ANAB ISO 17034 Accredited

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: 57047 122823 R = 8 | 5 | 24 Solvent: 24002546 Lot # Nitric Acid

Nominal Concentration (µg/mL): NIST Test Number: Recommended Storage: **Expiration Date:** 1000 **6UTB** Ambient (20 °C) 122826 5E-05 Balance Uncertainty 2%

> <u>E</u> 80.0

> > Nitric Acid

Formulated By:

Benson Chan

122823

Description:

Silver (Ag)

Weight shown below was diluted to (mL): 4000.30 0.058 Flask Uncertainty

1. Silver nitrate (Ag) Compound IN035 J0612AGA1 RM# Number 헏 Conc. (µg/mL) 1000.0 Nominal Purity Uncertainty Assay 8 Purity (%) 0.10 63.7 38 Weight (g) 6.27992 Target Weight (g) Conc. (µg/mL) 6.27998 Actual 1000.0 Actual +/- (µg/mL) Uncertainty Expanded 2.0 7761-88-B CAS# (Solvent Safety Info. On Attached pg.) SDS Information 10 ug/m3 Z 3151

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

NIST SRM

Reviewed By: Pedro L. Rentas 122823

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							race Me	letals	Verificat	tion	by ICP-I	S	ug/mL)						
	The state of the s						The Park of	, J											
A	<0.02	Ω	<0.02	Dy	<0.02	出	<0.02	Ľ	<0.02	Z	<0.02	7	<0.02	Se	<0.2	4	40.02	W	<0.02
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В	<0.02	δ	<0.02	Au	<0.02	광	<0.02	Z	<0.02	*	40.2	Sc	<0.02	ī	<0.02	Ħ	<0.02	2	<0.02

Physical Characterization:

(T)= Target analyte

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

Certified by:

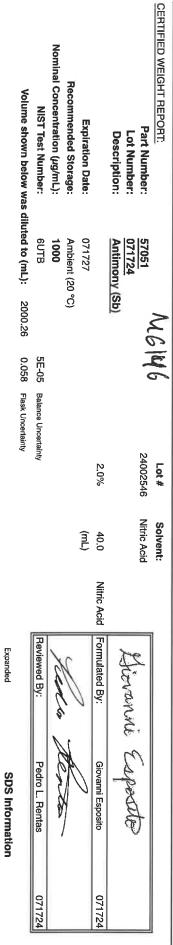
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Compound

Number Part

Number Ę

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL) Uncertainty

CAS#

OSHA PEL (TWA)

LD50

NIST SRM

(Solvent Safety Info. On Attached pg.)

Dilution Factor

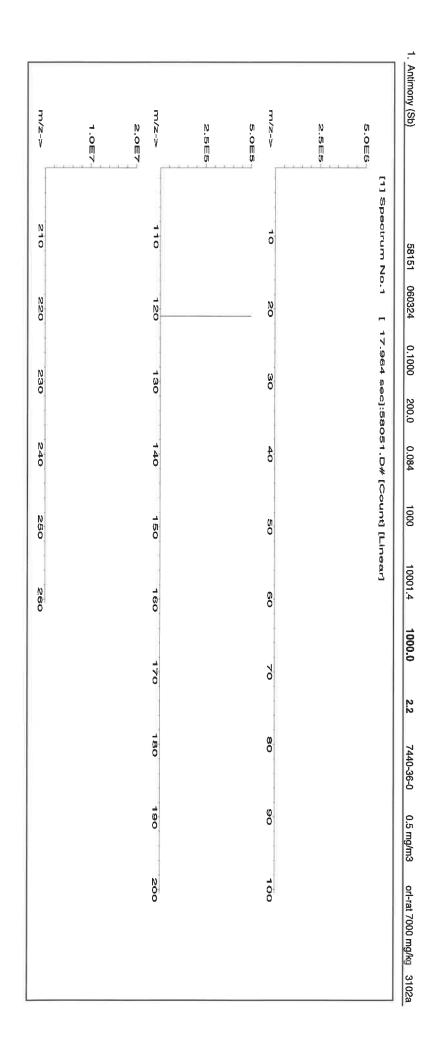
Initial

Uncertainty

Nominal

Initial

Final



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

	l		П		Н			Trace M	etals	Verifica		by ICP-M	S (µg	/mL)						
			2																	
_	<u>A</u>	<0.02	δ	<0.02	Dy	<0.02	Hf	<0.02	Ľ	<0.02	Z	<0.02	Pr	<0.02	Se	<0.2	Тъ	<0.02	W	<0.02
-	ď	Т	Ca	<0.2	턴	<0.02	Но	<0.02	Ľ	< 0.02	¥	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	q	<0.02
_	As	<0.2	ဂ္ဂ	<0.02	En	<0.02	ln	<0.02	Mg	<0.01	ွ	<0.02	Rh	<0.02	A9	<0.02	⊒	<0.02	<	<0.02
_	Ва —	<0.02	ß	<0.02	8	<0.02	lr	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Ŧ	<0.02	ΥЪ	<0.02
_	_{ве}	<0.01	다	<0.02	G	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	×	<0.02
	В	<0.02	Ç	<0.02	င္စ	<0.02	La	<0.02	Мо	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
	В	<0.02	δ	<0.02	Au	<0.02	Pb	<0.02	M	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	11	<0.02	Zr	<0.02
										(T) – Target analyte	et analy	do.								

(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).



Instructions for QATS Reference Material: Inorganic ICV Solutions

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

M6147

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

APPLICATION:

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

CAUTION:

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

the analyses.

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

Safety Data Sheets Available Upon Request

(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

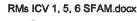
(C) ANALYSIS OF SAMPLES

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% (v/v) nitric acid.

Page 1 of 2









APIII

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
Ва	520	100
Ве	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

o soot to the manual crossing



Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses,

N6152

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

Page 1 of 2

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

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

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





Instructions for QATS Reference Material: ICP-AES ICS

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

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

ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO $_3$. Analyze this ICSA solution by ICP-AES.

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

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

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

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

HgiH timid (J\bu)	wod Limit (J\gy)	A haq 4 haq+ (J\by)	High Himid (A\g4)	Low Limit (µg/L)	A hsq (J\gy)	свог	Flement
285000	509000	247000	294000	216000	S22000	200	IA
117	979	818	0.09	0.09-	(0.0)	09	9S
120	4.88	104	0.01	0.01-	(0.0)	01	sA
757	337	(537)	506	⊅6 ŀ-	(0.9)	200	Ba
078	420	967	0.3	0.8-	(0.0)	0.8	Be
1120	928	279	0.8	0.4-	(0.1)	0.8	Cd
271000	188000	532000	282000	208000	242000	2000	БЭ
429	097	242	0.28	42.0	(0.23)	01	Cr
848	t0t	974	0.03	0.03-	(0.0)	09	0)
883	434	119	0.72	0.62-	(0.2)	52	nე
114500	84400	99300	116500	00998	101000	100	Еe
0.63	39.0	(0.64)	0.01	0.01-	(0.0)	01	dЯ
286000	210000	248000	294000	216000	S22000	2000	ВМ
78 9	430	703	22.0	0.8-	(0.7)	91	uΜ
1100	018	1 26	42.0	0.86-	(0.2)	07	!N
0.18	0.11	(0.94)	35.0	0.36-	(0.0)	35	əs
232	021	201	0.01	0.01-	(0.0)	01	₽A
133	0.88	(801)	0.82	0.82-	(0.0)	52	ΙL
999	714	167	0.03	0.08-	(0.0)	90	Λ
960L	608	796	0.09	0.09-	(0.0)	09	uZ

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



Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

analyses.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request M6153

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

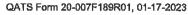
QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

(C) ANALYSIS OF SAMPLES

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

Page 1 of 2











APTIM

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

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

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

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

Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10,0	10.0	104	88.4	120
Ва	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Co	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
TI	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

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



Certificate of Analysis

ustry. R: 8/5/24

M6019

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:

Single Analyte Custom Grade Solution

Catalog Number:

CGSR1

Lot Number:

U2-SR730227

Matrix:

0.1% (v/v) HNO3

Value / Analyte(s):

1 000 μg/mL ea:

Strontium

Starting Material:

SrCO3

Starting Material Lot#:

M2-2192

Starting Material Purity:

99.9993%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:

1001 ± 3 µg/mL

Density:

1.000 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1

998 ± 4 µg/mL

ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985

Assay Method #2

1001 ± 3 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #3

1001 ± 2 µg/mL

Calculated NIST SRM Lot Number: See Sec. 4.2

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

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

Characterization of CRM/RM by Two or More Methods

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

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

X_i = mean of Assay Method i with standard uncertainty uchar i

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty (stora

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

X_a = mean of Assay Method A with

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

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

- 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 $0.3 \ \mu m$.

М	Ag	<	0.001980	М	Eu	<	0.000495	0	Na		0.000200	М	Se	<	0.013862	0	Zn		0.000143
0	Al		0.000370	0	Fe		0.000410	M	Nb	<	0.000495	i	Si	<		М	Zr	<	0.000495
M	As	<	0.000495	М	Ga	<	0.000495	М	Nd	<	0.000495	M	Sm	<	0.000495				
M	Au	<	0.000989	М	Gd	<	0.000495	0	Ni	<	0.007631	M	Sn	<	0.000990				
M	В	<	0.039606	М	Ge	<	0.000495	М	Os	<	0.000494	s	Sr	<					
М	Ba		0.006486	M	Hf	<	0.000495	i	Р	<		М	Та	<	0.000495				
М	Be	<	0.000990	M	Hg	<	0.000989	M	Pb	<	0.002970	М	Tb	<	0.000495				
М	Bi	<	0.000495	M	Но	<	0.000495	М	Pd	<	0.003957	М	Te	<	0.027724				
0	Ca		0.004255	M	ln	<	0.000495	M	Pr	<	0.000495	М	Th	<	0.000990				
M	Cd		0.001339	M	lr	<	0.000494	M	Pt	<	0.002970	М	Tī	<	0.005940				
M	Çe	<	0.004950	0	K	<	0.008184	М	Rb	<	0.002970	М	TI	<	0.000495				
М	Co	<	0.000495	M	La	<	0.000495	М	Re	<	0.000495	М	Tm	<	0.000495				
0	Cr	<	0.003207	0	Li	<	0.000884	0	Rh	<	0.012829	М	U	<	0.001485				
М	Cs	<	0.000990	M	Lu	<	0.002970	М	Ru	<	0.000989	М	٧	<	0.001980				
M	Cu		0.000099	0	Mg		0.000064	i	S	<		М	W	<	0.003960				
М	Dy	<	0.000495	0	Mn		0.000066	М	Sb	<	0.014852	0	Υ	<	0.000995				
М	Er	<	0.000495	М	Мо	<	0.001980	М	Sc	<	0.001980	М	Yb	<	0.000495				

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

6.0 INTENDED USE

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

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale.

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 87.62 +2 6 Sr(H2O)6+2 Chemical Compatibility - Soluble in HCl, and HNO3. Avoid H2SO4, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

Stability - 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1 - 3.5% HNO3 / LDPE container.

Sr Containing Samples (Preparation and Solution) -Metal (Best dissolved in diluted HNO3); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolution in dilute HCl).

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

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 88 amu	1200 ppt	N/A	72Ge16O, 176Yb+2,
			176Lu+2 , 176Hf+2
ICP-OES 407.771 nm	0.0004 / 0.00006 µg/mL	1	U, Ce
ICP-OES 421.552 nm	0.0008 / 0.00004 μg/mL	1	Rb
ICP-OES 460.733 nm	0.07 / 0.003 μg/mL	1	Се

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, Ve. 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

March 03, 2023

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

11.2 Lot Expiration Date

- March 03, 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:	
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- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director 20178hi

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			၀ (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 ST	>	
(Solvent Safety Info. On Attached pg.)	SDS Information		Pedro L. Rentas	" human	A A		Aleah O'Brady	0	San O To asign	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

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Part # 57081



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

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

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Physical Characterization:

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

* 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% (mL) 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

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Part # 57023

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

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Physical Characterization:

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

Certified by:

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

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

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



Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: WW-LFS-1

 Lot Number:
 T2-MEB723367

 Matrix:
 5% (v/v) HNO3

Value / Analyte(s): 1 000 μg/mL ea:

Potassium,

600 µg/mL ea: Phosphorus,

300 μg/mL ea:

Sodium, Iron,

200 μg/mL ea:

Magnesium, Aluminum, Cerium, Selenium,

Thallium,

100 μg/mL ea:

Lead, Calcium,

80 μg/mL ea: Arsenic,

70 μg/mL ea: Mercury, 50 μg/mL ea: Nickel, 40 μg/ml ea:

40 μg/mL ea: Chromium,

30 μg/mL ea:

Copper, Boron,

Vanadium,

20 µg/mL ea:

Zinc, Strontium,
Barium, Beryllium,
Cadmium, Cobalt,
Manganese, Lithium,

7.5 μg/mL ea:

Silver

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

Density: 1.034 g/mL (measured at 20 \pm 4 °C)

Assay Information:

ANALYTE Ag	METHOD ICP Assay	NIST SRM# 3151	SRM LOT# 160729
Ag	Volhard	999c	999c
Ag	Calculated	9990	See Sec. 4.2
Ag Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
В	ICP Assay	3107	190605
Ва	ICP Assay	3104a	140909
Ва	Gravimetric	0.10.10	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
Се	ICP Assay	3110	090504
Се	EDTA	928	928
Со	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	121207
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	Traceable to 3152A	S2-NA700842
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
Р	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Sr	EDTA	928	928
Sr 	ICP Assay	Traceable to 3153a	K2-SR650985
TI	ICP Assay	3158	151215
V	IC Assay	3165	160906
V 7n	EDTA ICD Assess	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 One Method Characterization of CRM/RM by Two or More Methods Certified Value, X_{CRM/RM}, where two or more methods of characterization are Certified Value, $\mathbf{X}_{\text{CRM/RM}}$, where one method of characterization used is the weighted mean of the results: is used is the mean of individual results: $X_{CRM/RM} = \Sigma(w_i) (X_i)$ $X_{CRM/RM} = (X_a) (u_{char a})$ X_i = mean of Assay Method i with standard uncertainty u_{char i} X_a = mean of Assay Method A with w_i = the weighting factors for each method calculated using the inverse square of 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 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{1/2}$ where u_{char} are the errors from each characterization method $u_{char\ a}$ = the errors from characterization u_{bb} = 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) u_{ts} = 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)

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 30, 2022

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

11.2 Lot Expiration Date

- August 30, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date:	
- Sealed To Fibad Open Dale.	

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director Paul R Line

Certificate of Analysis

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution

Catalog Number: WW-LFS-2
Lot Number: T2-MEB715594

Matrix: 5% (v/v) HNO3

tr. HF

Value / Analyte(s): 200 µg/mL ea:

Silica,

80 μg/mL ea: Antimony,

70 μg/mL ea:

Tin,

40 μg/mL ea: Molybdenum, 20 μg/mL ea: Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE CERTIFIED VALUE ANALYTE CERTIFIED VALUE Antimony, Sb 80.1 \pm 0.6 μ g/mL Molybdenum, Mo 40.04 \pm 0.24 μ g/mL Silica, SiO2 200.2 \pm 1.1 μ g/mL Tin, Sn 70.1 \pm 0.4 μ g/mL

Titanium, Ti $20.02 \pm 0.14 \mu g/mL$

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

Assay Information:

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

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 17, 2022

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

11.2 Lot Expiration Date

- February 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 C 	pen Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines

Chairman / Senior Technical Director

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