

8900, Fax: 908 789 8922

Prep Standard - Chemical Standard Summary

Order ID: P5117

Test: Mercury, Metals ICP-TAL

Prepbatch ID: PB165448,PB165717,

Sequence ID/Qc Batch ID: LB133794,LB134024,

Standard ID:

MP83208, MP83210, MP83481, MP83482, MP83484, MP83485, MP83486, MP83487, MP83488, MP83489, MP83490, MP83491, MP83492, MP83493, MP83494, MP83495, MP83496, MP83498, MP83619, MP83620, MP83621, MP83622, MP83623, MP83625, MP83626, MP83627, MP83628, MP83629, MP83630, MP83631, MP83632, MP83633, MP83634, MP83635, MP83636, MP83717, MP83718, MP83719, MP83720, MP83718, MP83719, MP83720, MP83718, MP83718, MP83719, MP83720, MP83718, MP83718, MP83719, MP83720, MP83718, MP83718, MP83718, MP83719, MP83720, MP83718, MP83718, MP83718, MP83719, MP83720, MP83718, MP83718, MP83718, MP83718, MP83719, MP83720, MP83718, MP83718, MP83718, MP83718, MP83719, MP83720, MP83718, M

Chemical ID:

 $\begin{array}{l} M4371, M4583, M4916, M5062, M5288, M5295, M5304, M5390, M5476, M5496, M5498, M5513, M5515, M5516, M5519, M5585, M5658, M5697, M5698, M5739, M5751, M5769, M5798, M5799, M5800, M5801, M5802, M5806, M5815, M5817, M5818, M5819, M5873, M5874, M5882, M5884, M5953, M5961, M5962, M5976, M5978, M5981, M5982, M5983, M6021, M6023, M6025, M6028, M6030, M6033, M6035, M6121, M6125, M6126, W3112, M6125, M6126, W3112, W$



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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
65	POTASSIUM PERMANGANATE SOLUTION 5 %	MP83208	11/11/2024	05/11/2025		METALS_SCA LE_3 (M SC-3)		11/11/2024

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
67	SODIUM CHLORIDE - HYDROXYL- CHLORIDE	MP83210	11/11/2024	05/11/2025		METALS_SCA LE 3 (M SC-3)		11/11/2024
	SOLUTION					(00 0)		11/11/2024

SOLUTION 2000.0000

2000.00000ml of W3112 + 240.00000gram of M4371 + 240.00000gram of M5884 = 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>PipetteID</u>	Supervised By Sarabjit Jaswal
871	MERCURY INTERMEDIATE B 250PPB WORKING STD.	MP83481	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

FROM 1.00000ml of M6126 + 2.50000ml of M5062 + 96.50000ml of W3112 = Final Quantity: 100.000 ml

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1340	Hg 0.00 PPB STD	MP83482	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	•

FROM 2.50000ml of M6126 + 247.50000ml of W3112 = Final Quantity: 250.000 ml





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Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
1341	Hg 0.2 PPB STD	MP83484	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
	0.50000 1.5110100 0.1500000 1	514/0440					A)	

FROM 2.50000ml of M6126 + 247.30000ml of W3112 + 0.20000ml of MP83481 = Final Quantity: 250.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1342	Hg 2.5 PPB STD	MP83485	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	•

2.50000ml of M6126 + 245.00000ml of W3112 + 2.50000ml of MP83481 = Final Quantity: 250.000 ml **FROM**





Metals STANDARD PREPARATION LOG

Recipe ID	NAME.	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1343	Hg 5.0 PPB STD	MP83486	12/06/2024	12/07/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	
							A)	

FROM 2.50000ml of M6126 + 242.50000ml of W3112 + 5.00000ml of MP83481 = Final Quantity: 250.000 ml

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1344	Hg 7.5 PPB STD	MP83487	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	•

FROM 2.50000ml of M6126 + 240.00000ml of W3112 + 7.50000ml of MP83481 = Final Quantity: 250.000 ml



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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
1345	Hg 10.0 PPB STD	MP83488	12/06/2024	12/07/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	
							A)	

FROM 2.50000ml of M6126 + 237.50000ml of W3112 + 10.00000ml of MP83481 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1346	Hg ICV SOLUTION	MP83489	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	12/09/2024

FROM 2.50000ml of M5953 + 2.50000ml of M6126 + 245.00000ml of W3112 = Final Quantity: 250.000 ml



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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
1351	ICB (Hg 0.00 PPB SOLUTION)	MP83490	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG	
							A)	

FROM 2.50000ml of M6126 + 247.50000ml of W3112 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
1358	CCV (Hg 5.0 PPB SOLUTION)	MP83491	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP	
							ETTE_5 (HG	12/09/2024

FROM 485.00000ml of W3112 + 5.00000ml of M6126 + 10.00000ml of MP83481 = Final Quantity: 500.000 ml



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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		
1352	CCB (Hg 0.00 PPB SOLUTION)	MP83492	12/06/2024	12/07/2024	Mohan Bera		METALS_PIP ETTE_5 (HG			
	A)									

FROM 495.00000ml of W3112 + 5.00000ml of M6126 = Final Quantity: 500.000 ml

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
1349	CRA/CRI (Hg 0.2 PPB SOLUTION)	MP83493	12/06/2024	12/07/2024	Mohan Bera	None	METALS_PIP ETTE_5 (HG	

FROM 2.50000ml of M6126 + 247.30000ml of W3112 + 0.20000ml of MP83481 = Final Quantity: 250.000 ml



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Metals STANDARD PREPARATION LOG

1350 CHK STD (Hg 7.0 PPB SOLUTION) MP83494 12/06/2024 12/07/2024 Mohan Bera None METALS_PIP ETTE_5 (HG 12/09/202	Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
	1350	` 0	MP83494	12/06/2024	12/07/2024	Mohan Bera	None	_	

FROM 2.50000ml of M6126 + 240.50000ml of W3112 + 7.00000ml of MP83481 = Final Quantity: 250.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date		<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
887	AQUA REGIA FOR HG ON 7471A	MP83495	12/06/2024	12/07/2024	Mohan Bera	None	None	12/09/2024

FROM 150.00000ml of M6121 + 50.00000ml of M6126 = Final Quantity: 200.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
68	STANNOUS CHLORIDE SOLUTION	MP83496	12/06/2024	12/07/2024		METALS_SCA LE_3 (M SC-3)		12/09/2024

FROM 450.00000ml of W3112 + 50.00000gram of M5882 + 50.00000ml of M6121 = Final Quantity: 500.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
169	1:1HNO3	MP83498	12/09/2024	12/28/2024	Janvi Patel	None	None	12/09/2024
		<u> </u>						12/00/2021

FROM 1250.00000ml of M6126 + 1250.00000ml of W3112 = Final Quantity: 2500.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Mohan Bera
1122	ICPMS CALIB BLANK(S0/ICB/CCB)	MP83619	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	12/17/2024

FROM 25.00000ml of M6121 + 4925.00000ml of W3112 + 50.00000ml of M6126 = Final Quantity: 5000.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3947	S7(SFAM,6020,200.8)	MP83620	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM

0.10000 ml of M5476 + 1.00000 ml of M5799 + 1.00000 ml of M5818 + 1.00000 ml of M5981 + 1.00000 ml of M5983 + 1.90000 ml of M6033 + 10.00000 ml of M6126 + 2.00000 ml of M5815 + 2.00000 ml of M5817 + 4.00000 ml of M5390 + 4.00000 ml of M6025 + 4.90000 ml of M5515 + 4.90000 ml of M5519 + 5.00000 ml of M6121 + 50.00000 ml of M5304 + 832.50000 ml of M5312 + 9.00000 ml of M5698 + 9.00000 ml of M5751 + 9.00000 ml of M5819 + 9.00000 ml of M5976 + 9.00000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3948	S6(SFAM,6020,200.8)	MP83621	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 48.50000ml of W3112 + 50.00000ml of MP83620 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3949	S5(SFAM,6020,200.8)	MP83622	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 73.50000ml of W3112 + 25.00000ml of MP83620 = Final Quantity: 100.000 ml



Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3954	S4(SFAM,6020,200.8)	MP83623	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 86.00000ml of W3112 + 12.50000ml of MP83620 = Fine	= Final Quantity: 100.000 ml
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Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3951	S3(SFAM, 6020,200.8)	MP83625	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 88.50000ml of W3112 + 10.00000ml of MP83621 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3955	S2CONC(SFAM,6020,200.8)	MP83626	12/13/2024	01/07/2025	Sarabjit Jaswal	None	None	
								12/17/2024

FROM

0.05000 ml of M5476 + 0.05000 ml of M5698 + 0.05000 ml of M5798 + 0.05000 ml of M5800 + 0.05000 ml of M5801 + 0.05000 ml of M5801 + 0.05000 ml of M5981 + 0.05000 ml of M5983 + 0.05000 ml of M6023 + 0.05000 ml of M6025 + 0.05000 ml of M6028 + 0.05000 ml of M6030 + 0.10000 ml of M5658 + 0.10000 ml of M5751 + 0.10000 ml of M5802 + 0.10000 ml of M6033 + 0.25000 ml of M5515 + 0.25000 ml of M5799 + 0.25000 ml of M5819 + 0.25000 ml of M5962 + 0.25000 ml of M5976 + 0.25000 ml of M5976 + 0.25000 ml of M5818 + 1.25000 ml of M5815 + 1.25000 ml of M5817 + 2.50000 ml of M5498 + 2.50000 ml of M5519 + 2.50000 ml of M5769 + 2.50000 ml of M5806 + 2.50000 ml of M6121 + 226.25000 ml of W3112 + 5.00000 ml of M6126 = Final Quantity: 250.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3956	S2(SFAM,6020,200.8)	MP83627	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 98.00000ml of W3112 + 0.50000ml of MP83626 = Final Quantity: 100.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	PipetteID	Supervised By
3957	<u> </u>		12/13/2024		Sarabjit Jaswal		METALS_PIP	Mohan Bera
							ETTE_3 (A)	12/17/2024

FROM 0.50000ml of M6121 + 1.00000ml of M6126 + 88.50000ml of W3112 + 10.00000ml of MP83627 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3958	ICV(SFAM)	MP83629	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 2.00000ml of M5295 + 98.00000ml of MP83619 = Final Quantity: 100.000 ml



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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 Mohan Bera
1142	ICSA ICPMS	MP83630	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	
		-	-					

FROM 10.00000ml of M5873 + 90.00000ml of MP83619 = Final Quai	ity: 100.000 ml
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Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
1143	ICSAB ICPMS	MP83631	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 10.00000ml of M5873 + 10.00000ml of M5874 + 80.00000ml of MP83619 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date		<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3961	CCV	MP83632	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	

FROM

0.20000 ml of M5513 + 0.50000 ml of M5476 + 0.50000 ml of M5799 + 0.50000 ml of M5818 + 0.50000 ml of M5981 + 0.50000 ml of M5983 + 1.00000 ml of M5815 + 1.00000 ml of M5817 + 10.00000 ml of M6126 + 12.45000 ml of M5515 + 12.45000 ml of M5519 + 2.00000 ml of M5390 + 24.95000 ml of M5498 + 24.95000 ml of M5516 + 24.95000 ml of M5769 + 25.00000 ml of M5769 + 25.00000 ml of M5598 + 4.50000 ml of M5698 + 4.50000 ml of M5698 + 4.50000 ml of M6033 + 5.00000 ml of M6121 + 826.10000 ml of W3112 = Final Quantity: 1000.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	NAME.	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3962	MG 10PPM FOR TUNE	MP83633	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

FROM 0.01000ml of M5769 + 9.99000ml of MP83619 = Final Quantity: 100.000 ml





Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	<u>PipetteID</u>	Supervised By		
3894			12/13/2024		Sarabjit Jaswal	<u></u>	METALS_PIP			
							ETTE_3 (A)	12/17/2024		
<u>FROM</u>	FROM 2.00000ml of M6055 + 2.00000ml of MP83633 + 96.00000ml of MP83619 = Final Quantity: 100.000 ml									

<u>FROM</u>	2.00000ml of M6055 +	· 2.00000ml of MP83633 ·	+ 96.00000ml of MP83619	= Final Quantity: 100.000 ml
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Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3903	ISS 3PPM	MP83635	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

5.00000ml of M6126 + 75.00000ml of M5739 + 170.00000ml of MP83619 = Final Quantity: 250.000 ml **FROM**



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<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
2902	S8 ICPMS	MP83636	12/13/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/17/2024

1.00000ml of M6033 + 2.50000ml of M5288 + 2.50000ml of M5515 + 5.00000ml of M5498 + 5.00000ml of M5516 + 5.00000ml of M5769 + 79.00000ml of MP83619 = Final Quantity: 100.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3880	M&B SPIKE-1	MP83717	12/18/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/20/2024

FROM

5.00000ml of M5658 + 5.00000ml of M5798 + 5.00000ml of M5800 + 5.00000ml of M5802 + 5.00000ml of M5961 + 5.00000ml of M5962 + 5.00000ml of M5981 + 5.00000ml of M5982 + 5.00000ml of M5983 + 5.00000ml of M6021 + 5.00000ml of M6023 + 5.00000ml of M6028 + 5.00000ml of M6030 + 35.00000ml of MP83619 = Final Quantity: 100.000 ml



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Metals STANDARD PREPARATION LOG

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	ScaleID	<u>PipetteID</u>	Supervised By Mohan Bera
3881	M&B SPIKE-2	MP83718	12/18/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP ETTE_3 (A)	
FROM	10.00000ml of M5976 + 12.50000ml	of M5390 +	12.50000ml c	of M5515 + 12.	50000ml of M55	19 + 2.50000m	l of M5799 +	

10.00000ml of M5976 + 12.50000ml of M5390 + 12.50000ml of M5515 + 12.50000ml of M5519 + 2.50000ml of M5799 + 2.50000ml of M5818 + 5.0000ml of M5496 + 42.50000ml of MP83619 = Final Quantity: 100.000 ml

Recipe				Expiration	<u>Prepared</u>			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Mohan Bera
3882	M&B SPIKE-3	MP83719	12/18/2024	01/07/2025	Sarabjit Jaswal	None	METALS_PIP	
							ETTE_3 (A)	12/20/2024

FROM 0.62500ml of M5513 + 12.50000ml of M5697 + 12.50000ml of M5698 + 12.50000ml of M5819 + 11.87500ml of MP83619 = Final Quantity: 50.000 ml



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

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Metals STANDARD PREPARATION LOG

Recipe ID 3900	NAME M&B SPIKE-4	NO. MP83720	Prep Date 12/18/2024	Expiration Date 01/07/2025	Prepared By Sarabjit Jaswal	<u>ScaleID</u> None	PipetteID METALS_PIP ETTE_3 (A)	Supervised By Mohan Bera 12/20/2024
FROM	6.25000ml of M5498 + 6.25000ml of	M5769 + 6.	25000ml of M	5806 + 6.25000	Oml of MP83619	= Final Quant	ity: 25.000 ml	



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Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-2196-01 / Hydroxylamine Hydrochloride, Crystal (cs/4x500g)	0000215387	06/25/2025	07/01/2019 / RICHARD	06/07/2019 / RICHARD	M4371
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Labpure	0919120 / Boiling Stones	26275770	07/07/2025	07/03/2020 / mohan	05/07/2020 / mohan	M4583
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3227-05 / Potassium Permanganate (2.5kg)	210800	03/31/2026	11/30/2022 / mohan	07/28/2021 / mohan	M4916
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	MSHG-10PPM / MERCURY HCI 125mL 10ug/mL	S2-HG709270	09/22/2026	05/28/2022 / mohan	01/27/2022 / mohan	M5062
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58119 / K, 10000 PPM, 500 ml	071122	07/11/2025	09/01/2022 / jaswal	07/21/2022 / jaswal	M5288
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-1 / ICV (ICP/ICPMS) STOCK SOLN	ICV-1014	02/05/2025	08/07/2024 / jaswal	04/20/2021 / bin	M5295



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020CAL-1 / Calibration Standard Method 6020	S2-MEB711244	10/20/2026	08/07/2024 / jaswal	04/01/2022 / jaswal	M5304
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	072122	07/21/2025	08/07/2024 / jaswal	09/18/2022 / bin	M5390
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57138 / Sr, 10000 PPM, 125 ml	082922	08/29/2025	07/29/2024 / jaswal	03/16/2023 / jaswal	M5476
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / Al, 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 / Received By	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	031523	03/15/2026	08/15/2023 / jaswal	03/17/2023 / bin	M5498
	- -	-			-	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	092122	09/21/2025	08/01/2024 / Jaswal	03/17/2023 / bin	M5515
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	022123	11/06/2025	11/06/2024 / kareem	03/17/2023 / bin	M5516
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57119 / Potassium (K) 10,000PPM	120822	12/08/2025	01/08/2024 / bin	03/17/2023 / bin	M5519
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	26397-103 / PTFE BOILING STONES	W126678	02/28/2025	01/20/2024 / jaswal	06/12/2023 / jaswal	M5585
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
	58029 / Cu, 1000 PPM,	102523	10/25/2026	04/03/2024 /	10/27/2023 /	



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58025 / Mn, 1000 PPM, 500 ml	102623	10/26/2026	04/18/2024 / jaswal	10/27/2023 / jaswal	M5698
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	6020ISS / 6020ISS, 10 ug/ml, Bi, Ho, In, 6Li, Rh, Sc, TB, Y	T2-MEB709511	09/03/2026	08/07/2024 / jaswal	04/11/2022 / jaswal	M5739
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	071723	07/17/2026	10/01/2024 / Jaswal	08/25/2023 / jaswal	M5751
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / 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 #
Supplier Absolute Standards, Inc.	ItemCode / ItemName 57004 / Be, 1000 PPM, 125 ml	Lot # 102523	-	=		
Absolute	57004 / Be, 1000 PPM,		Date	Opened By 02/09/2024 /	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.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	120523	12/05/2026	08/07/2024 / jaswal	01/03/2024 / jaswal	M5802
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 /	Chemtech Lot #
Absolute Standards, Inc.	57115 / P, 10000 PPM, 125 ml	041723	04/17/2026	05/21/2024 / Jaswal	02/09/2024 / jaswal	M5815
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Absolute Standards, Inc.	57116 / S, 10000 PPM, 125 ml	071123	07/11/2026	03/01/2024 / jaswal	02/09/2024 / jaswal	M5817



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Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57014 / Si, 1000 PPM, 125 ml	122023	12/20/2026	03/06/2024 / jaswal	02/09/2024 / jaswal	M5818
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58030 / Zinc, Zn, 500 ml, 1000 PPM	111623	11/16/2026	03/20/2024 / jaswal	02/09/2024 / jaswal	M5819
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART A / ICSA (ICPMS) STOCK SOLN	CP-MS ICSA-0803	04/30/2025	04/17/2024 / jaswal	07/14/2022 / jaswal	M5873
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSB (ICPMS) STOCK SOLUTION	CP-MS ICSB-0803	04/30/2025	04/17/2024 / jaswal	07/14/2022 / jaswal	M5874
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3980-01 / Stannous Chloride (cs/4x500g)	232820	08/31/2028	04/30/2024 / mohan	04/25/2024 / mohan	M5882
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3624-05 / Sodium Chloride, Crystal (cs/4x2.5kg)	0000281938	07/06/2026	04/30/2024 / mohan	04/25/2024 / mohan	M5884



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-5 / ICV (HG)STOCK SOLN	ICV5-0415	01/01/2025	07/01/2024 / mohan	03/30/2023 / mohan	M5953
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57028 / Ni, 1000 PPM, 125 ml	041124	04/11/2027	07/02/2024 / Jaswal	06/11/2024 / Jaswal	M5961
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGMO1-1 / MOLYBDENUM 125mL 1000ug/mL	T2-MO720876	07/17/2027	08/07/2024 / jaswal	02/22/2024 / Jaswal	M5976
			1	1	1	
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Supplier Inorganic Ventures	ItemCode / ItemName CGTI1-1 / TITANIUM 125mL 1000ug/mL	Lot # T2-TI719972	I -	-		
Inorganic	CGTI1-1 / TITANIUM		Date	Opened By 08/07/2024 /	Received By 02/22/2024 /	Lot #



Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	031524	03/15/2027	07/01/2024 / Jaswal	06/11/2024 / Jaswal	M5982
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57040 / Zr, 1000 PPM, 125 ml	071423	07/14/2026	07/29/2024 / Jaswal	06/11/2024 / Jaswal	M5983
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023
	1111			Kareem		
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened /	Received Date / Received By	Chemtech Lot #
		Lot # 061224	-	Date Opened /	Received Date /	
Supplier Absolute	ItemCode / ItemName 57082 / Pb, 1000 PPM,		Date	Date Opened / Opened By	Received Date / Received By	Lot #



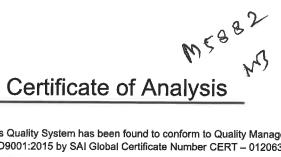
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / AI, 10000 PPM, 500 ml	011623	01/16/2026	08/07/2024 / Jaswal	01/03/2024 / Jaswal	M6033
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	IV-STOCK-12 / ICP-MS TUNING SOLUTION, 125mL	U2-MEB734294	06/21/2028	08/21/2024 / Jaswal	08/19/2024 / Jaswal	M6055
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed	0000275677	05/13/2025	11/13/2024 / Eman	10/13/2024 / Eman	M6121
	(cs/6x2.5L)					
Supplier	(cs/6x2.5L) ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	Chemtech Lot #
Supplier PCI Scientific Supply, Inc.		Lot # 820803	I -	=		
PCI Scientific	ItemCode / ItemName 1403 / Hydrogen Peroxide,		Date	Opened By 11/26/2024 /	11/22/2024 /	Lot #



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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 / lwona	W3112





1 Reagent Lane Fair Lawn, NJ 07410 201,796,7100 tel

Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System

Standard ISO9001:2015 by SAI Global Certificate Number CERT - 0120633 201,796,1329 fax

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the final formulator and end user to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The following information is the actual analytical results obtained.

		·	
Catalog Number	T142	Quality Test / Release Date	08/17/2023
Lot Number	232820		
Description	STANNOUS CHLORIDE, DIHYDRAT	TE CERTIFIED ACS (Suitable for Me	rcury Determination)
Country of Origin	United States	Suggested Retest Date	Aug/2028
Chemical Origin	Inorganic-non animal		
BSE/TSE Comment	No animal products are used as starti processing aids, or any other materia	ing raw material ingredients, or used I that might migrate to the finished pr	in processing, including lubricants, oduct.

N/A	H. M. C. S. C.		Was I will still
Result Name	Units	Specifications	Test Value
APPEARANCE		REPORT	Clear crystals
ASSAY	%	Inclusive Between 98 - 103	100.65
CALCIUM	%	<= 0.005	0.0017
IDENTIFICATION	PASS/FAIL	= PASS TEST	PASS TEST
IRON (Fe)	%	<= 0.003	0.0011
LEAD (Pb)	%	<= 0.01	0.0006
MERCURY (Hg)	ppm	<= 0.05	<0.05
POTASSIUM (K)	%	<= 0.005	0.0001
SODIUM (Na)	%	<= 0.01	<0.01
SOLUBILITY IN HCL	PASS/FAIL	= PASS TEST	PASS TEST
SULFATE (SO4)	PASS/FAIL	= P.T. (ABOUT 0.003%)	P.T. (ABOUT 0.003%)

Harout Sahagian - Quality Control Supervisor - Fair Lawn

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

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

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

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Physical Characterization:

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

Part # 57048

2 of 2

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

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

R: 815/24 M6025

CERTIFIED WEIGHT REPORT: Part Number: 57182 110923 Solvent: 24002546 Lot #

Nitric Acid

Lot Number: Description: Lead (Pb)

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

Expiration Date:

110926

2%

Nitric Acid

Formulated By:

Lawence Barry

110923

110923

Revience

40.0

Weight shown below was diluted to (mL): **NIST Test Number: 6UTB** Lot 2000.02 Nominal 0.058 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Uncertainty Reviewed By: Expanded Pedro L. Rentas SDS information

E P.3	1. Lead(II) nitrate (Pb)	Compound
[1] Spectrum No.1	IN029 PBD122016A1	Lot Nominal Purity Uncertainty Assay Target Actual RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Weight (g)
17.284 5	11	Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%) \(\begin{array}{c}\)
7	99.999	Purity (%)
של מו	0.10	Uncertainty Purity (%)
	62.5	Assay (%)
nel II ino	32.0006	Target Weight (g)
	10000 99.999 0.10 62.5 32.0006 32.0040	Actual Weight (g)
		Actual Conc. (µg/mL)
	20.0	Actual Uncertainty onc. (µg/mL) +/- (µg/mL)
	10099-74-8	(Solv
	10001.1 20.0 10099-74-8 0.05 mg/m3	Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (ug/mL) +/- (ug/mL) CAS# OSHA PEL (TWA) LD50
	intryns-rat 93 mg/kg 3128	tached pg.) LD50
	3128	NIST SRM

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200	100	

Part # 57182

1 of 2



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

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

						ı	I race Me	Metals	Verifica	T S	by ICP-	NS (μg/mL)			1			
	40.02	8	40.02	Dy	40.02	Hf	A).02		4 0.02	Z:	∆ 0,02		P	1	<0.02	- d0.02 Se	- d0.02 Se		
S	A).02	ದಿ	40.2	Ē.	40.02	Но	40.02	Ē	40.02	\$	40.02	_	Re	Re		△ 0.02	<0.02 Si <0.02	<0.02 Si <0.02	
S	40.2	င္ပ	40.02	핕	40.02	F	40.02	Mg	<0.01	ဝွ	<0.02		짪		40.02	<0.02 Ag .	<0.02 Ag <0.02		40.02 Ag 40.02 TI 40.02
Ba	40.02	ಭ	40.02	ନୁ	40,02	F	A0.02	M	<0.02	골	40,02	_	장		40.02	<0.02 Na	<0.02 Na <0.2	<0.02 Na <0.2 Th	<0.02 Na <0.2 Th <0.02
Be	40.01	ភ	A.02	୍ଲ	₩	귡	40.2	9H	∆0.2	שי	40.02	727	<u>~</u>		40,02	40.02 Sr .	40.02 Sr .	<0.02 Sr <0.02 Tm	<0.02 Sr <0.02 Tm
В	A).02	င	40.02	ද	A0.02	2	40.02	Mo	<0.02	≯	40.02	-	B		40.02	40.02 S	40.02 S 40.02	<0.02 S <0.02 Sn	<0.02 S <0.02 Sn <0.02
Œ	40.02	ξ	40.02	Au	40.02	3	T	Z	<0.02	×	40.2	_	જ	Т	<0.02	<0.02 Ta ·	√0.02 Ta √0.02	40.02 Ta 40.02 Ti	40.02 Ta 40.02 Ti

Physical Characterization:

(T)= Target analyte

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

Sor I Mill

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

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

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

M4371

Hydroxylamine Hydrochloride, Crystal BAKER ANALYZED® A.C.S. Reagent

Suitable for Mercury Determination (hydroxylammonium chloride)

Rec - 06.07.12





Material No.: 2196-01

Batch No.: 0000215387

Manufactured Date: 2018/06/27 Retest Date: 2025/06/25

Revision No: 1

Certificate of Analysis

Meets ACS Reagent Chemical Requirements,

Specification	Result
>= 96.0 %	99.1
Passes Test	PT
<= 0.050 %	0.017
<= 0.25	0.19
Passes Test	PT
<= 0.005 %	< 0.003
<= 5 ppm	4
<= 5 ppm	< 3
<= 0.050 ppm	< 0.005
	>= 96.0 % Passes Test <= 0.050 % <= 0.25 Passes Test <= 0.005 % <= 5 ppm <= 5 ppm

For Laboratory, Research or Manufacturing Use

Country of Origin:

CN

Packaging Site:

Paris Mfg Ctr & DC



Phillipsburg, NJ 9001:2015, FSSC22000
Paris, KY 9001:2008
Mexico City, Mexico 9001:2008
Gliwice, Poland 9001:2015, 13485:2012
Selangor, Malaysia 9001:2008
Dehradun, India, 9001:2008, 14001:2004, 13485:2003
Mumbai, India, 9001:2015, 17025:2005
Panoli, India 9001:2015

Jamie Ethier
Vice President Global Quality

WAZY DX.



Manufacturer:

Saint-Gobain Performance Plastics 11 Sicho Drive Poestenkill, NY 12140

Certificate of Conformance

Part Number		Customer Part Number/ Revision:	1069103 N/A
Description:	*PTFE BOILING STONES-450 GRA	AMS	
Lot Number:	26275770	Lot Quantity:	10 EA
Date of Manufacture (MM/DD/YY)	03/23/20	Expiration Date: (MM/DD/YY)	N/A
(Refer to th	Post Processing Run Number: ne attached Certificate for Additional Detail)		N/A

We certify the material listed above confirms in full with the following specifications:

All items have been manufactured, inspected, tested, and accepted in accordance with our Quality Management system, ISO 9001-2015. Documentation substantiating this certification is kept on record per the Company's retention policy and is available for review.

All materials and processes used in manufacturing conform to the materials and/or manufacturing specifications and notes indicated on the purchase order, drawing, specifications, quality assurance requirements, or other applicable documents effective on the date of manufacture.

Saint-Gobain does not warrant the product for any particular application and it is the responsibility of the user to conduct tests that are deemed necessary to determine the suitability of the product for any particular use. Saint-Gobain's sole responsibility shall be for failure to manufacture the product in accordance with specifications and requirements of the buyer, and from defects in material and workmanship. This warranty is expressly made in lieu of any and all other warranties and Saint-Gobain's sole liability shall be to replace any product not in conformance with the specification and requirements of the buyer.

Quality Approval:	goodla Kondla	Date:	05/13/20	
	,			



M4913- 16



Certificate of Analysis

1 Reagent Lane Fair Lawn, NJ 07410 201.796.7100 tel 201.796.1329 fax

Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System Standard ISO9001:2015 by SAI Global Certificate Number CERT – 0120632

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the final formulator and end user to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The following information is the actual analytical results obtained.

Catalog Number	P279	Quality Test / Release Date	01/12/2021
Lot Number	210306		
Description	POTASSIUM PERMANGANATE, A.C.S.	The second secon	
Country of Origin	United States	Suggested Retest Date	Jan/2026

N/A			
Result Name	Units	Specifications	Test Value
APPEARANCE		REPORT	Dark purple to purple green crystals
ASSAY	%	>= 99	99.3
CHLORIDE & CHLORATE	%	<= 0.005	<0.005
IDENTIFICATION	PASS/FAIL	= PASS TEST	pass test
INSOLUBLE MATTER	%	<= 0.2	<0.2
MERCURY (Hg)	ppm	<= 0.05	<0.004
SULFATE (SO4)	%	<= 0.02	<0.02

Julian Burton

Julian Burton - Quality Control Manager - Fair Lawn



Certificate of Analysis

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

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

Product Code:

Single Analyte Mass Spec Solution

Catalog Number:

MSHG-10PPM

Lot Number:

S2-HG709270

Matrix:

10% (v/v) HCI

Value / Analyte(s):

10 μg/mL ea:

Mercury

Starting Material:

Hg metal

Starting Material Lot#:

1959

Starting Material Purity:

99.9994%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value:

 $10.001 \pm 0.053 \,\mu g/mL$

Density:

1.020 g/mL (measured at 20 ± 4 °C)

Assay Information:

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

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

Characterization of CRM/RM by Two or More Methods

Certified Value, X_{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 i with standard uncertainty $\mathbf{u_{char}}$ i

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

the variance.

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

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

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

u_{bb} = 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})

Xa = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k (u²char a + u²bb + u²lts + u²ts) 1/2

k = coverage factor = 2

u_{char a} = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

u_{lts} = 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.

```
O Ag
          0.000011 M Eu <
                            0.000201 O Na
                                              0.000004 M Se <
                                                               0.015915 O Zn <
                                                                                 0.001510
0
   Al
          0.000001 O Fe
                            0.000001 M Nb <
                                              0.000201 O Si
                                                                0.000005 M Zr <
                                                                                 0.000201
M
   As <
          0.000402 M Ga <
                            0.000201 M Nd <
                                              0.000201 M Sm <
                                                               0.000201
M
   Au <
          0.003631 M Gd <
                            0.000201 M Ni <
                                              0.000402 M
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   B <
          0.001208 M
                    Ge <
                            0.000201 M Os <
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          0.000201 M Hf <
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          0.000201 M
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                            0.000201 M Pd <
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                                              0.000402 M Ti <
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                                              0.000201 O TI <
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  Ce <
          0.000201 O K
                            0.000020 M
                                      Rb <
                                                               0.016508
  Co <
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          0.000201 M La <
                            0.000201 M
                                      Re <
                                              0.000201 M Tm <
                                                               0.000201
  Cr <
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          0.003021 O Li <
                            0.000107 M
                                      Rh <
                                              0.000201 M U <
                                                               0.008058
M
  Cs <
          0.001208 M Lu <
                            0.000201 M Ru <
                                              0.000201 M V <
                                                               0.000201
M
  Cu <
          0.000402 O
                    Mg
                            0.000001 O
                                      S <
                                             0.053950 M W <
                                                               0.000604
M Dy <
          0.000201 M Mn <
                            0.000604 M Sb <
                                             0.001208 M Y <
                                                               0.000201
M Er <
          0.000201 M Mo
                           0.000009 M Sc <
                                             0.000201 M Yb <
                                                               0.000201
```

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° 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 - 200.59 +2 4 Hg(OH)(aq) 1+ **Chemical Compatibility -** Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 22, 2021

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

11.2 Lot Expiration Date

- September 22, 2026
- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

Sealed TCT	Bag	Open Date	:		

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Uyen Truong
Supervisor, Product Documentation

Mya Truong

Certificate Approved By:

Michael Booth Director, Quality Control Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director Paul R Laines

Absolute Standards, Inc. www.absolutestandards.com

Certified Reference Material CRM R 07/21

2029

Nitric Acid

20510011 Lot#

Solvent:

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

Nitric Acid

40.0 (mL)

5%

Potassium (K)

071122

Part Number: Lot Number: Description:

CERTIFIED WEIGHT REPORT:

Ambient (20 °C)

10000 **6UTB**

071125

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

071122

071122

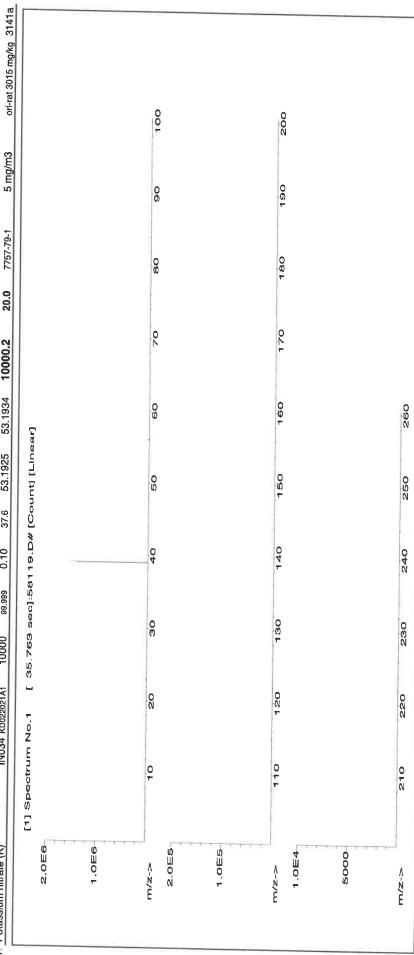
Weight shown below was diluted to (mL):	diluted	to (mL):	2000.02	0.058	0.058 Flask Uncertainty	inty								_
										Expanded		SDS Information		
		Lot	Nomina	Purity	Uncertainty	Assay	Purity Uncertainty Assay Target	Actual	Actual	ual Actual Uncertainty	(Solvent	(Solvent Safety Info. On Attached pg.)	(pur)	Ž
ompound	RM#	RM# Number C	Conc. (µg/mL)	(%)	(%) Purity (%) (%)	(%)	Weight (g)	Weight (g)	Conc. (ug/mL)	Weight (g) Weight (g) Conc. (ug/mL) +/- (µg/mL)	CAS# 0	CAS# OSHA PEL (TWA)	LD50	<i>V</i>

5E-05 Balance Uncertainty

Weight shown below was diluted to (mL):

NIST Test Number:

											[41] Specific and Mark 1990 1990 1990 1990 1990 1990 1990 199		A continuo	200 [1]
o 3141a	orl-rat 3015 mg/kg 3141a	5 mg/m3	20.0 7757-79-1	20.0	53.1934 10000.2	53.1934	37.6 53.1925	37.6	0.10	99.999	IN034 KD022021A1 10000 99.999	KD022021A1	IN034	Potassium nitrate (K)
SRM	LD50	CAS# OSHA PEL (TWA)	CAS#	+/- (ng/mL)	Weight (g) Weight (g) Conc. (ug/mL) +/- (ug/mL)	Weight (g)	Weight (g)	(%)	Punty (%) (%)	(<u>Q</u>	Num Number Conc. (µg/mL) (%)	MUTTIDE	Malik	
22	traciled pg.)	The calculation of A	3	(a						()3	Comp (, may)	Mirmhor	DW#	Compound
NICT	ttached no)	Actual Uncertainty (Solvent Safety Info On Attached no.)	(So	Uncertainty	Actual	Actual	Target	Assay	Uncertainty Assay	Punty	Nominal Purity	F01		



Lot # 071122

Printed: 8/2/2022, 11:20:01 PM



Certified Reference Material CRM

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

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

Physical Characterization:

(T)= Target analyte

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



Certified by:

Printed: 8/2/2022, 11:20:01 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).



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

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

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

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

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

the analyses.

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

> Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

ICV1-1014

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

Page 1 of 2



RMs ICV 1, 5, 6 SFAM.docx



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

Instructions for QATS Reference Material: Inorganic ICV Solutions

ICV1-1014

For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.

ICV5-0415

For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting 1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v) K₂Cr₂O₇ and 5% (v/v) nitric acid.

ICV6-0400

For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6 concentrate into a 100 mL volumetric flask and dilute to volume with Type II water. Distill this solution along with the samples before analysis. The cyanide concentrate is prepared from K₃Fe(CN)₆, Type II water, and 0.1 % sodium hydroxide, and will decompose rapidly if exposed to light.

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

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

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

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



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

Matrix:

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

5% (v/v) HNO3

Catalog Number: 6020CAL-1 Lot Number: S2-MEB711244

tr. HF

Value / Analyte(s): 20 µg/mL ea:

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

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

Assay Information:

58	say information:			
	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151 999c	160729
	Ag	Volhard		999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	As	ICP Assay	3103a	100818
	Ba	ICP Assay	3104a	140909
	Ba	Gravimetric	2405-	See Sec. 4.2
	Be	ICP Assay	3105a	090514
	Ca	ICP Assay	3109a	130213
	Ca	EDTA	928	928
	Cd	ICP Assay	3108	130116
	Cd	EDTA	928	928
	Co	ICP Assay	3113	190630
	Co	EDTA	928	928
	Cr	ICP Assay	3112a	170630
	Cu	ICP Assay	3114	121207
	Cu	EDTA	928	928
	Fe	ICP Assay	3126a	140812
	Fe	EDTA	928	928
	Fe	Calculated		See Sec. 4.2
	K	ICP Assay	3141a	140813
	K	Gravimetric		See Sec. 4.2
	Mg	ICP Assay	3131a	140110
	Mg	EDTA	928	928
	Mn	ICP Assay	3132	050429
	Mn	EDTA	928	928
	Na	ICP Assay	3152a	120715
	Na	Gravimetric		See Sec. 4.2
	Ni	ICP Assay	3136	120619
	Ni	EDTA	928	928
	Pb	ICP Assay	3128	101026
	Pb	EDTA	928	928
	Se	ICP Assay	3149	100901
	Se	Calculated		See Sec. 4.2
	TI	ICP Assay	3158	151215
	TI	Calculated		See Sec. 4.2
	V	ICP Assay	3165	160906
	V	EDTA	928	928
	Zn	ICP Assay	3168a	120629
	Zn	EDTA	928	928

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

October 20, 2021

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

- Sealed TCT Bag Open Date: ₋	
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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.

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 Laines

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

Part Number:

57056

Solvent:

20510011

Nitric Acid

200

40.0

Nitric Acid

Description: Lot Number:

072122 Barium (Ba)

Certified Reference Material CRM

Riograph 33

Lot #

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

Formulated By: Liovannie Giovanni Esposito appeal 2

072122

Reviewed By: Pedro L. Rentas 072122

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

1. Barium nitrate (Ba)

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 072125

NIST Test Number:

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

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

Certified Reference Material CRM



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

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

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Physical Characterization:

(T)= Target analyte

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



Certified by:

2 of 2

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

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

All standard containers are meticulously cleaned prior to use.

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

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

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

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



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

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

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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	STANSON STANSON				SIGNATURE.	STON SAFETY SAGE	S. Parlie	THE SHARE SHARE	Series .		Sec.	STREET, STREET	- 100 mm	THE PERSON NAMED IN	THE PERSON			
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(T) = Target analyte

Physical Characterization:

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



Certified by:

Printed: 3/16/2023, 1:45:15 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

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

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



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

SRM

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

Lot # 061522

Certified Reference Material CRM



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

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

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Physical Characterization:

(T)= Target analyte

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



Certified by:

Lot # 061522

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03/12/23

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CERTIFIED WEIGHT REPORT: 1. Iron (Fe) Compound Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: m/z-> m/z-> 5.0E7-5.0E7-1.0E8 1.0E8 2.0E4 NIST Test Number: 1.0E4 **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 [30.763 sec]:58126.D# [Count] [Linear] 110 5 IN346 2224912-500 58126 092122 Iron (Fe) 10000 **6UTB** 092125 Ambient (20 °C) Number Εţ 120 20 Conc. (µg/mL) 5000.1 10000 Nominal 130 30 99.995 5E-05 Balance Uncertainty Purity Uncertainty Assay 0.12 Flask Uncertainty 8 Purity (%) 0.10 140 6 Solvent: 20510011 100.0 8 7.0% 50.0034 Weight (g) 350.0 Lot # 150 50 Target (III) Nitric Acid Weight (g) Conc. (µg/mL) Nitric Acid 50.0111 Actual 160 60 10001.5 Actual 170 70 +/- (µg/mL) Expanded Reviewed By: Formulated By: Uncertainty 20.0 Giovannie 7439-89-6 0.8 180 CAS# (Solvent Safety Info. On Attached pg.) Giovanni Esposito Pedro L. Rentas Japane 1 OSHA PEL (TWA) SDS Information 190 90 5 mg/m3 200 100 orl-rat 7500mg/kg 3126a 092122 092122

SRM TSIN

m/z->

210

220

230

240

250

260

Certified Reference Material CRM





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

							Trace Me	stals	Verificat	ion b	y ICP-MS	gu)	/mL)						
STORY .	000				200		404				NAME OF TAXABLE PARTY.								
æ	40.02	3	70.05	ŝ	70'0>	Ē	70102	3	Z0702	ž	<0.10	£	₹0.02	š	402	e	40.02	*	40.02
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Ä	40.02	රි	Ø.10	ප	40.10	ጟ	40.02	Mo	40.02	£	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Z	<0.05
В	<0.02	ರ	<0.10	Απ	<0.02	£	<0.02	R	<0.02	M	<0.2	ß	<0.02	Ta	<0.02	F	<0.02	Z	<0.02

(T)= Target analyte

Physical Characterization:

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2 of 2

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Certified Reference Material CRM

B

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

Nitric Acid

21110221

Solvent:

Sodium (Na)

Description:

Part Number: Lot Number:

CERTIFIED WEIGHT REPORT:

Expiration Date: Recommended Storage:

022123

Lot #

Lawrence Barry Formulated By:

022123

Pedro L. Rentas

022123

Reviewed By:

Nitric Acid 60.0 (mL) % Ambient (20 °C) 022126

10000

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB

5E-05 Balance Uncertainty 0.06 Flask Uncertainty 3000.41 Weight shown below was diluted to (mL):

SIEM SIEM LD50 SDS Information (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) CAS# +/- (mg/ml) Expanded Uncertainty Conc. (ug/mt.) Actual Weight (g) Actual Weight (g) Target Uncertainty Assay 8 Purity (%) Purity (%) Conc. (ug/mL) Nominal Number 5 RM# Compound

orl-rat 3430 mg/kg 3152a 5 mg/m3 7631-99-4 20.0 100001 111.5410 111.5406 26.9 0.10 88.88 10000 IN036 NAV01201511 1. Sodium nitrate (Na)

8.935 sec]:58111.D# [Count] [Linear] [1] Spectrum No.1

100

06

5.0E6 2.5E6

120 110 M/z->

200

190

180

170

160

150

140

130

5.0E6 2.5E6

210 m/z->

Lot # 022123 Part # 58111

260

250

240

230

220

Certified Reference Material CRM





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

							Lace	detals	s Verifica		by ICP-N	MS (t	(ng/mL)						
-			No. of Persons in	ALC PROPERTY.		The same of			NAME OF PERSONS ASSESSED.	Second Second		EZURM	DOMESTING BESTER	Michiga	HARMAGON WALL	No.		Table 1	THE PERSON NAMED IN
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(T) = Target analyte

Physical Characterization:

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Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT:

Part Number:

Description: Lot Number:

58119 120822 Potassium (K)

Solvent: 20510011 Nitric Acid

Lot #

Javanva

アイクラクスで

60.0 <u>a</u>

2%

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 10000 Ambient (20 °C) 120825

Recommended Storage:

Expiration Date:

Weight shown below was diluted to (mL):

3000.4

5E-05 Belance Uncertainty

0.06 Flask Uncertainty

Nitric Acid

Formulated By:

Giovanni Esposito

120822

Reviewed By:

Pedro L. Rentas

120822

12 [1]	Potassium nitrate (K)	Compound
[1] Spectrum No.1 [35.763 sec]:58119 D# (Count II Insert	IN034 KD022021A1 10000 99.989 0.10 37.6 79.7990 79.8075	Lot Nominal Purity Uncertainty Assay Target Actual RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Weight (g) C
35.763 se	10000	Nominal Purity Uncertainty Assay Conc. (µg/ml.) (%) Purity (%) (%)
9C]:58	99.999	Purity (%)
119.0	0.10	Uncertainty Purity (%)
# []	37.6	Assay (%)
inti II ina	79.7990	Target Weight (g)
	79.8075	Actual Weight (g)
	10001.1	Actual Conc. (µg/mL
	10001.1 20.0 7757-79-1	Expanded Uncertainty +/- (µg/mL)
	7757-79-1	(Solv
	5 mg/m3	Expanded SDS Information Actual Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50
	orl-rat 3015 mg/kg 314	n tached pg.) LD50
	kg 3141a	NIST

m/z-y	5000	m/z->	1.0E5	m/z->	1.000	2.016
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Lot # 120822

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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Lot # 120822



MATERIAL CERTIFICATE OF COMPLIANCE

DATE: JUNE 12, 2023

CUSTOMER:

PCI SCIENTIFIC SUPPLY, INC

PURCHASE ORDER NO.

6054931

CATALOG NO.

BOI5021-450L

PRODUCT DESCRIPTION:

BOILING STONES, TFE, 454GMS

QUANTITY:

10 EACH

LOT NO.

W126678

SPECIFICATION (S):

Made from Virgin PTFE Resin

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

Laura Valencia

Quality Assurance Inspector

F:U:J:CF:PCISCI:GOC-55118-BQI5021-061223

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Certified Reference Material CRM

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

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

2.0% 40.0 Nitric Acid

(III)

Formulated By:

Lawrence Barry

060523

060523

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

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

P20

TSIN SRM

3112a

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

m/z->	N 5 10	5.0E5	5.0E5	m/z->	5000	1.004
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		170		70		
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		0				
		190		90		
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		Ŏ		0		

Part # 58024



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

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(I)= larget analyte

Physical Characterization:

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Certified Reference Material CRM

R: 10/23/23 M5697



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



CERTIFIED WEIGHT REPORT						Lot #	Solvent:						
Part Number: Lot Number:		58029 102523				24002546	Nitric Acid				Ι,		
Description:		Copper (Cu)	ন							Joint Strategy	Commence of the Commence of th		
						2.0%	40.0	Nitric Acid	Formulated By:		Benson Chan	102523	
Expiration Date:	••	102526					(ml.)		١	2	6		
Recommended Storage:		Ambient (20 °C)	(၃						1	*	N.		
Nominal Concentration (µg/mL):		1000							K	S. S.	Crea !		
NIST Test Number:		6UTB		5E-05	Balance Uncertainty	nty		1	Reviewed By:		Pedro L. Rentas	102523	
Volume shown below was diluted to (mL):	was dilute	d to (mL):	200002	0.058	Flask Uncertainty			ı					
									Expanded		SDS Information	uc	
	Part	Lot	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solver	(Solvent Safety Info. On Attached pg.)	tached pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL) C	onc. (ug/mL)	Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL)		+/- (ng/mL)	CAS#	OSHA PEL (TWA)	LD50	SRM
Copper(II) nitrate trihvdrate (Cu)	58129	58129 100223 0.1000	0.1000	200.0	0.084	1000	10000.1	1000.0	6.0	10031-43-3	1 ma/m3	ori-rat 794 mo/kg	3114
,											l		

1.0E6	[1] Spectrum No.1	L'ON L'O		422 sec]:5	[33.422 sec]:58029.D# [Count] [Linear]	Sound (Lir	near]	1000				
5.0E5	(A)											
m/z->		0	O	OE	04	20	9	, v	O C	06	00	
2.5E7												
m/z-> 2.0E7	0		120	130	041	150	160	170	000 F	190	000	
1.067												
<-Z/L	210		220	230	240	250	860					

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

Verification by ICP-MS (μg/mL)	Ni <0.02 Pr <0.02 Se <0.2 Tb <0.02 W	40.02 Nb <0.02 Re <0.02 Si <0.02 Te <0.02 U <0.02	Os <0.02 Rb <0.02 Ag <0.02 T1 <0.02 V	Pd <0.02 Rb <0.02 Na <0.2 Th <0.02 Yb	P <0.02 Ru <0.02 Sr <0.02 Tm <0.02 Y	Pt <0.02 Sm <0.02 S <0.02 Sn <0.02 Zn	K <0.2 Sc <0.02 Ta <0.02 Ti <0.02 Zr
Trace	L	0.02	_	<0.02		_	
	H	Ho	ᄪ	느	-F	۳.	£
	<0.02	<0.02	<0.02	<0.02	40.02	<0.02	<0.02
	Δy	西	超	3	ర్	පී	Ρū
	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	Ę-m
	3	రౌ	೮	ರೆ	ರ	රි	ਹੋ
	<0.02	₹0:05	40.2	<0.02	<0.01	<0.02	<0.02
	IA	SP PS	As	Ba	æ	Ä	m

(T) = Target analyte

Physical Characterization:

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





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

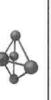
Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

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

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A: 10/23/23 4 M5698



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		8	24002546	Nitric Acid				
- 1 mm			2.0%					
man — V			2.0%			The state of the s		
			2.0%			Charles Contraction of the Contr	The second se	
				60.0	Nitric Acid	Formulated By:	Benson Chan	102623
				(mL)		1	9	
						1	The state of the s	
Nominal Concentration (AgmL): 1000						Learly	Kena	
NIST Test Number: 6UTB	5E-05	Balanca Uncertainty				Reviewed By:	Pedro L. Rentas	102623
Volume shown below was diluted to (mL): 3000.41 (0.058	Flask Uncertainty			,			
						Expanded	SDS Information	
Part Lot Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solvent Safety Info. On Attached pg.)	ed pg.)
Compound Number Number Factor V	Vol. (mL)		nc. (ug/mL)	Conc. (ug/mL)	Pipette (mL) Conc. (μg/mL) Conc. (μg/mL) Conc. (μg/mL) +/- (μg/mL)		CAS# OSHA PEL (TWA)	LD50

orl-rat >300mg/kg 3132

5 mg/m3

20694-39-7

2.1

1000.0

100001

0001

0.084

300.0

0.1000

071123

1. Manganese(II) nitrate tetrahydrate (Mn) 58125

Part # 58025

1 of 2



Certified Reference Material CRM

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ANAB ISO 17034 Accredited AR-1539 Certificate Number

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

							Trace M	letals	Verification	tion	by ICP-I	4S (µg	J/mL)						
	THE REAL PROPERTY.	STATE OF	CANCEL CANCEL	THE STATE	SCHOOLS STATE OF	No.	SPECIFICATION SPECIFICATION OF THE PERSON NAMED IN COLUMN TWO IN COLUMN TO THE PERSON NAMED IN C	STATE OF THE PERSON	SEAMMANNIES OF	Wante fallen	SCHOOL SANGERS	W-2000	Applications.	Section Section					Control of the Contro
A!	<0.02	පි	<0.02	፭	<0.02	HŁ	<0.02	3	<0.02	ž	<0.02	뇹	<0.02	S	<0.2	J.P.	<0.02	3	<0.02
&	<0.02	రే	<0.2	西	<0.02	Ho	20.0≥	٦	₹0.02	£	<0.02	2	<0.02	Š	<0.02	Te	<0.02	ם	<0.02
As	<0.2	ర	<0.02	超	<0.02	ų	<0.02	Mg	₹0.01	ő	<0.02	뙶	<0.02	Ag	<0.02	F	<0.02	>	₹ 0.02
Ba	<0.02	ర	<0.02	3	<0.02	H	<0.02	Mn	H	Pd	<0.02	Rb	<0.02	Na B	<0.2	T.	<0.02	χp	₹0.02
Be	40.01	ඊ	<0.02	Ö	40.02	굕	40.2	Hg	<0.7	۵,	<0.02	Ru	<0.02	Sr	<0.02	Ę	<0.02	×	<0.02
Bi	₹0.02	රි	<0.02	පි	<0.02	r _a	<0.02	Mo	40.02	Z,	<0.02	Sm	<0.02	S	₹0.02	Sn	<0.02	Zn	<0.02
В	<0.02	₫	<0.02	Αu	<0.02	Pb	<0.02	PN	<0.02	×	<0.2	Sc	<0.02	Ę	<0.02	F	<0.02	77	40.02
																			1

(T) = Target analyte

Physical Characterization:

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

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

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

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



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R:8/25) Lot # Solvent:

21110221

Nitric Acid

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

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

(mL)

40.0

Nitric Acid

Formulated By:

Benson Chan

071723

NIST Test Number: BTU9 2000.02 0.058 5E-05 Flask Uncertainty Balance Uncertainty

Part

Lot

Dilution

Initia

Uncertainty

Nominal

Initial

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): 1000

Reviewed By: Pedro L. Rentas

 Copper(II) nitrate trihydrate (Cu) 58129 Number 022723 Number 0.1000 Factor Val. (mL) 200.0 Pipette (mL) Conc. (µg/mL) 0.084 1000 Conc. (µg/mL) Conc. (µg/mL) 10000.5 1000.0 2.2 10031-43-3 1 mg/m3 ori-rat 794 mg/kg 3114

Final +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information LDSO TSIN SRM

071723

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

Part # 58029

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

	[9 9	, E	, <u>H</u>	Ą	. S	· Þ	1	Γ	
	F	_				_		Statement of the last of the l		
	20.02	200	8 2	20.02	40.2	20.02	0.02			
	2	. წ	. τ	<u>က</u>	င္စ	წ	Ω			
	-	40.02	0.02	A).02	0.02	∆ 0.2	40.02	The second second		
	A	- Ge	ဂ္ဂ	S	퍨	耳	Dy			
	40.02	40.02	A) 02	40.02	40.02	40.02	<0.02			
	198	F	क्र	F,"	5	Ήο	Ж	DESTRUCTION OF THE PERSON NAMED IN		
	40.02	40.02	40,2	40.02	40.02	40.02	<0.02	HILIPAGESTARING SHIPE	Irace M	1
	Z	Мо	ВН	Min	Mg	£	Ľ.	N/S/GREEN	etais	
(T) = Tarnot analyto	40,02	40.02	82	<0.02	<0.01	<0.02	<0.02	MINISTERNATION OF THE PERSON NAMED IN	Verifica	
de anak	×	29	ъ	ъ	õ	¥	Z	STATES NAMED IN	tion	
7	∆0.2	40.02	40.02	40.02	<0.02	40.02	<0.02	Michigan Described	oy ICP-N	
	Sc	Sm	Ru	Rb.	Rh.	æ	7		SUE	,
	40.02	40.02	40.02	40.02	40.02	<0.02	40.02		J/mL)	,
	Ta	Ø	Ş.	Z	À	Si	še			
	40,02	40.02	40.02	40.2	40.02	<0.02	<0.2			
	11	Sn	Tm	Ħ	∄	.	Tb			
	40.02	40,02	<0.02	<0.02	40.02	40.02	<0.02			
	Zr	25	×	\$	<	٦	W	THE REAL PROPERTY.		
	<0.02	40.02	♦ 0.02	< 0.02	< 0.02	<0.02	<0.02			

(I) = larget analyte

Physical Characterization:

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

Certified by:

- * 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 # 58029

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



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CERTIFIED WEIGHT REPORT: Magnesium nitrate hexahydrate (Mg) IN030 маровгозата Compound Nominal Concentration (µg/mL): m/z-> M/2-> m/z-> Weight shown below was diluted to (mL): Recommended Storage: 2.0≡4 1.OE4 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



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

	555	В	Ве	Ва	As	Sb	A		
						_			
	∆0.02	0.02	40.01	<0.02	60.2	<0.02	<0.02		
	₽ C	ဝ	Ω	Ŝ	ද	ದ್	Ω		
	∆ 0.02	<0.02	<0.02	<0.02	40.02	40.2	<0.02		
	Αu	ရွာ	က္အ	8	탇	耳	Dy		
	₹0,02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
	73	L _a	Fe	F	In I	Ho	Hf		ı
	<0.02	40,02	40.2	<0.02	<0.02	<0.02	<0.02	I acc	-1
	Z.	Mo	Hg	Mn	Mg	ŗ	5	Mergis	2
)	<0.02	<0.02	<0.2	<0.02	⊷]	<0.02	<0.02	Verifica	No.
	×	7.	Р	Pd	S _O	Ş	Z		
	40.2	40.02	40.02	<0.02	<0.02	40.02	<0.02	יטע וכד-ו	3
	Sc	Sm	Ru	Rb	Rh	Re	Pr	JU (F	
	<0.02	<0.02	<0.02	40.02	40.02	<0.02	<0.02	g/mL)	
	Ta	CO.	Sr	Na	δķ	Σ:	Se		١
	<0.02	<0.02	<0.02	<0.2	<0.02	<0.02	40.2		
	Ti	Sn	Im	Th	∄	Te	-Tι-		
	<0.02	0.02	0.02	40.02	40.02	40.02	<0.02		
	Zr	Z	ĸ	4,4	٧	u	¥		
	<0.02	40.02	40.02	40.02	A).02	<0.02	40.02		

(1) = larget analyte

Physical Characterization:

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

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

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

24002546 Nitric Acid

2.0%

Nominal Concentration (µg/mL):

NIST Test Number:

BTU₉ 1000

Volume shown below was diluted to (mL):

2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Recommended Storage:

Ambient (20 °C) 102526

Expiration Date:

Lot Number: Description:

Beryllium (Be)

40.0

Nitric Acid

Benson Chan

102523

Formulated By:

Reviewed By:

Pedro L. Rentas 102523

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





800-368-1131



Certified Reference Material CRM

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

							Trace M	etals	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	None and a	. 18						
F	<0.02	3	<0.02	Ďλ	<0.02	HL	<0.02	Li	<0.02	z	<0.02	Ā	<0.02	Se	<0.2	T.	<0.02	M	<0.02
Sp	<0.02	ථ	40.2	占	₹0.02	He	<0.02	3	<0.02	£	<0.02	Re	<0.02	Š	<0.02	ę	₹0.02	Þ	<0.02
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.

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

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

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

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

122



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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. Ammortium 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

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

	Al Shaper	
	4000 4000 4000 4000 4000 4000 4000 400	
	58555	ı
	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	
	A C C C E E Dy	
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	HH Ho Hr Fe	
	40.02 40.02 40.02 40.02 40.02	Irace N
	Mo Min Li	1etal:
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T) = Tamet anak/a	× 7 × 8 8 8 × 1	ation
	44444	by CP-
	S R R R R P	7) SM
	40.02 40.02 40.02 40.02 40.02	Ja/mL)
	Z S Z Z S	
	40.02 40.02 40.02 40.02 40.02 40.02	
	T T T T T	
	40.02 40.02 40.02 40.02 40.02	
	* * * * * * * * * * * * * * * * * * *	
	000 000 000 000 000 000	

(I) = larget analyte

Physical Characterization:

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

Certified by:

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

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

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

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Certified Reference Material CRM

R: 02109124





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

						TANK BURNE	10000	CHICAGO CONTROL CONTRO	URCH LABILLY	ianioc)	(Solvent Safety Into, On Attached pg.)	rttached pg.)	202
Compound	Number	Number	Factor	Vol. (mL)	Pipette (mL) C	conc. (ug/ml.)	Conc. (µg/mL)	Conc. (ug/ml.)	+/- (ng/mL)	CAS#	Number Number Factor Vol. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA)	1050	SRM
Cobatt(II) nitrate hexahydrate (Co) 58127 050923 0.1000 200.0	58127	050923	0.1000		0.084	1000	10000	100001 100001	9.0	10008.000	000	700	- 5
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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):

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



Lot # 091923

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

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

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

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Certified Reference Material CRM

M5801



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CERTIFIED WEIGHT REPORT: 1. Arsenic (As) Compound Nominal Concentration (µg/mL): M/2-> m/z-> -z/m 5.OE4 2.5E4 Recommended Storage: 1.0E5 2.0日5 1000 Volume shown below was diluted to (mL): 500 **NIST Test Number: Expiration Date:** Part Number: Description: Lot Number: [1] Spectrum No.1 210 110 0 58133 Number Part **SUTB** 1000 111326 57033 111323 Ambient (20 °C) Arsenic (As) 020522 Number 120 D D ONN NO [34.433 sec]:57033.D# [Count] [Linear] 0.1000 4000.0 Dilution Factor 230 130 30 Vol. (mL) 5E-05 400.0 initial 0.06 Pipette (mL) Conc. (µg/mL) Flask Uncertainty Balance Uncertainty Uncertainty 240 140 40 0.084 24002546 Nominal 2.0% Lot # 100 250 160 50 Conc. (µg/mL) Conc. (µg/mL) Nitric Acid 10001.0 Solvent: Initial 80.0 260 160 60 Nitric Acid 1000.0 Fina 170 0 Formulated By: Reviewed By: +/- (µg/ml.) Uncertainty Expanded 2.0 180 Thomas 80 7440-38-2 (Solvent Safety Info. On Attached pg.) 190 OSHA PEL (TWA) Pedro L. Rentas Lawrence Barry 90 SDS Information 0.5 mg/m3 100 000 orl-rat 500 mg/kg LD50 111323 111323 3103a NIST SRM

Printed: 2/8/2024, 5:01:04 PM

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 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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Certified Reference Material CRM

109/24

M5817

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

CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: 071123 57116

Solvent:

071123

ASTM Type 1 Water

Burense

Formulated By:

Lawrence Barry

071123

Lot #

Expiration Date: Description: 071126 Sulfur (S)

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

Recommended Storage:

EU1B

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

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

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

Expanded

071123

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

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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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Certified Reference Material CRM

109124 M.5818

Solvent: 24002546 Nitric Acid

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

CERTIFIED WEIGHT REPORT:

Part Number:

Lot Number: Description: 57014 122023

Silicon (SI)

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

Expiration Date:

122026

2%

40.0 (mL)

Nitric Acid

Formulated By:

Aleah O'Brady

122023

122023

Areah o Brasky

Compound			Weight shown below was diluted to (mL): 1999.48 0.058 Flask Uncertainty	NIST Test Number	The second secon
RM#			elow was diluted	Number:	
Number	Lot		d to (mL):	8TUB	
Conc. (µg/mL)	Nominal		1999.48		
(%)	Purity		0.058	5E-05	
Purity (%)	Nominal Purity Uncertainty Assay		Flask Uncerta	5E-05 Balance Uncertainty	
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Weight (g)	Target				
Weight (g)	Actual				
Conc. (ug/mL)	Actual				
+/- (ug/mL)	Uncertainty	Expanded		Reviewed By:	/
CAS#	(Solve				
OSHA PEL (TWA)	Lot Nominal Purity Uncertainty Assay Target Actual Actual Uncertainty (Solvent Safety Info. On Attac	SDS Information		Pedro L. Rentas	1

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*	orl-mus 70 mg/kg	2.5 mg/m3	2.0 16919-19-0	2.0	1000.0	13.8855	13.8854	14.4	0.10	99.999	1000	IN009 SID082022A1	Ammonium hexafluorosilicate (Si) IN009 sido82022A1 1000 99.999 0.10 14.4 13.8854 13.8855 1000.0
	Esc	COMA TEL CINA)	CAS#	(ASA) +/- (ASA)	רטות. (ששיוור)	(A) THEISTA	(B) Millione	(101)	fact frience	(00)	400	(A) mediu (A) many (sa) (sa) (sa) mediu (A) mediu (A) conc.	

92 II	CAS#		CAS# OSHA PEL (TWA) LD50 SRM 1919-19-0 2.5 mg/m3 orl-mus 70 mg/kg NA	1. Ammonium hexafluorosilicate (Si) IN009 siposzozza1 1000 98.899 0.10 14.4 13.8854 13.8855 1000.0 2.0 169	Compound RM# Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL)
		Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) 1000.0 2.0 16919-19-0 2.5 mg/m3	Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) 1000.0 2.0 18919-19-0 2.5 mg/m3	10 14.4 13.8	(%) (%) Weigh
Conc. (µg/mL) +/- (µg/mL) 1000.0 2.0 10	Conc. (µg/mL) +/- (µg/mL) CAS# 1000.0 2.0 16919-19-0			3854 13.8855	ht (g) Weight (g)
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Part # 57014

1 of 2



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

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(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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Certified Reference Material CRM

2 02/na

ング

Solvent: 24002546

Nitric Acid

F Lot #

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

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: 58030

Description:

111623 Zinc (Zn)

Ambient (20 °C) 111626

Expiration Date:

Nominal Concentration (µg/mL): Recommended Storage:

NIST Test Number:

BTU9 1000

5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Weight shown below was diluted to (mL):

3000.4

5

Nominal

Purity

Uncertainty Assay

Target

Actual

Actual

Uncertainty

Expanded

84 60.0 <u>a</u>

Nitric Acid

Formulated By: Benson Chan

111623

Reviewed By: Pedro L. Rentas

111623

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



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

200

100

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

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100	22×2<=		
	\$ 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		

(I) = larget analyte

Physical Characterization:

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

Certified by:

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

the preparation of all standards.

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

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

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

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

Sodium Chloride, Crystal BAKER ANALYZED® A.C.S. Reagent







Material No.: 3624-01

Batch No.: 0000281938

Manufactured Date: 2021-06-07

Retest Date: 2026-06-07

Revision No.: 1

Certificate of Analysis

Test	Specification	Result
Assay (NaCl) (by Ag titrn)	≥ 99.0 %	100.0 %
pH of 5% Solution at 25°C	5.0 - 9.0	6.3
Insoluble Matter	≤ 0.005 %	0.003 %
lodide (I)	≤ 0.002 %	< 0.002 %
Bromide (Br)	≤ 0.01 %	< 0.01 %
Chlorate and Nitrate (as NO ₃)	≤ 0.003 %	< 0.001 %
ACS - Phosphate (PO ₄)	≤ 5 ppm	< 5 ppm
Sulfate (SO ₄)	≤ 0.004 %	< 0.004 %
Barium (Ba)	Passes Test	Passes Test
ACS - Heavy Metals (as Pb)	≤ 5 ppm	< 5 ppm
ron (Fe)	≤ 2 ppm	< 1 ppm
Calcium (Ca)	≤ 0.002 %	< 0.001 %
Magnesium (Mg)	≤ 0.001 %	< 0.001 %
Potassium (K)	≤ 0.005 %	0.001 %

For Laboratory, Research, or Manufacturing Use Meets Reagent Specifications for testing USP/NF monographs Country of Origin: USA

Packaging Site: Paris Mfg Ctr & DC





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

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

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

> 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

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)₅, 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)
Al	2500	(after 50-fold dilution
Sb	1000	500
As	1000	200
Ba	520	200
Be	510	100
Cd	510	100
Ca	10000	100
Cr	520	2000
Co		100
Cu	520	100
Fe	510	100
Pb	10000	2000
Mg	1000	200
Mn	6000	1200
Ni	520	100
K	530	110
Se	9900	2000
Ag	1000	200
Na	250	50
TI	10000	2000
V	1000	210
Zn	500	100
	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



Certified Reference Material CRM

Lot #

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

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

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

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

= larget analyte

Physical Characterization:

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

Certified by:

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

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

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

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

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

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

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



Certified Reference Material CRM

M5962 R! 06/14/24



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

m/z->		i,	m/z->		10 c	÷ is	1. Selenium (Se)	Compound		<		Nominal Co	Re			CERTIFIED WEIGHT REPORT	מדודודה שובום
210	1.008	2.008	110	1.008	/z-> 10	[1] Spectrum No.1				Volume shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	1	Lot Number: Description:	Part Number:	1 11000H
0			0		Ū	Z	58134	Number	Part	as dilute					lie ie ii	_	
220			120		N 0	r.	071223	Number	Lot	d to (mL):	6UTB	1000	Ambient (20 °C)		060624 Selenium (Se)	57034	
Ŋ			4		ω	3.702	0.1000	Factor	Dilution	2000.07			<u>೦</u>		Se)		
230			130		90	sec]:58	200.0	Val. (mL	Initial	0.100	5E-05						
240			140		40	33.702 sec]:58034.D# [Count] [Linear]	0.084	Vol. (mL) Pipette (mL) Conc. (µg/mL)	Uncertainty	Flask Uncertainty	Balance Uncertainty						
250			150		50	Count) [L	1000	Conc. (µg/mL)	Nominal	ťγ	ainty			2.0%	24007540	24002546	
260			160		. 60	inear 2	10002.5	Conc. (µg/mL	Initial				(mL)	40.0	No.	Solvent:	
o							1000.0	Conc. (µg/mL) Conc. (µg/mL)	Final					Nitric Acid			(1)
			170		70		2.2	.) +/- (µg/mL)	Uncertainty	Expanded	Reviewed By:	K	N	Formulated By:	M		10
			180		80		7782-49-2	C	(So		y:	200	11	Ву:			
			190		90		2 0.2 mg/m3	OSHA PEL (TWA)	(Solvent Safety Info. On Attached pg.)	SDS Information	Pedro L. Rentas	leenes		Benson Chan	M		
			200		100			NA)). On Atta	rmation	ntas	,	/	5			
			-		J		orl-rat 6700 mg/kg	LDS0	ched pg.)		060624			060624			
							3149	SRM	NIST		4			4-1		_	

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

							I race M	1etals	Verifica	lion	oy ICP-M	S (H	g/mL)						
Al	<0.02	CG	<0.02	Dγ	<0.02	HH	<0.02	11	<0.02	Z.	<0.02	Pr	<0.02	Se	H	16	40.02	W	40,02
SЪ	<0.02	ದ್ದ	<0.2	퍜	<0.02	н	<0.02	Į	<0.02	₽	<0.02	Re	40.02	S:	<0.02	Te	<0.02	U	<0.02
As	<0.2	ಕಿ	<0.02	핃	<0.02	Ħ	<0.02	Mg	<0.01	°	<0.02	Rh	40.02	Ag	<0.02	∄	40.02	۷	<0.02
Ва	<0.02	င္တ	<0.02	æ	<0.02	ŀ	<0.02	Mn	<0.02	Pd	40.02	₽.	<0.02	Na	<0.2	Ħ	<0.02	ታ	<0.02
Ве	40.01	ť	40.02	Ga	<0.02	F	<0.2	Hg	A02	P	<0.02	Ru	40.02	Sr	<0.02	Tm	<0.02	¥	<0.02
Bi	40.02	င္ပ	<0.02	ଦୁ	<0.02	Ľ	<0.02	Mo	<0.02	7	<0.02	Sm	40.02	S	<0.02	Sn	40.02	Zn	<0.02
В	<0.02	Cι	<0.02	Au	<0.02	Рь	<0.02	M	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<0.02	Z	<0.02

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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

- * 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).



Refine your results. Redefine your industry.

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

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



2.0 **PRODUCT DESCRIPTION**

Product Code:

Single Analyte Custom Grade Solution

Catalog Number:

CGMO1

Lot Number:

T2-MO720876

Matrix:

H2O

tr. NH40H

Value / Analyte(s):

1 000 µg/mL ea:

Molybdenum

Starting Material:

Ammonium Molybdate

Starting Material Lot#:

2361

Starting Material Purity: 99.9893%

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Value:

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

Density:

1.000 g/mL (measured at 20 ± 4 °C)

Assav Information:

Assay Method #1

998 ± 4 µg/mL

ICP Assay NIST SRM 3134 Lot Number: 130418

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

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

u_{(s} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X_a = mean of Assay Method A with

ucher a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Page 1 of 4

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

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

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 17, 2022

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Uyen Truong Supervisor, Product Documentation

Meyer Trusing

Certificate Approved By:

Michael Booth Director, Technical Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director Paul R Saine

Certificate of Analysis 6652M , 8782M

MORGANIC NE NE SE SEGENE YOU TREST

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

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com



ACCREDITATION / REGISTRATION

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

PRODUCT DESCRIPTION

Catalog Number:

Single Analyte Custom Grade Solution Product Code:

CGTN

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

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

Starting Material Lot#: 2094 Starting Material: Ti Metal

Starting Material Purity: 99.9975%

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

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

Assay Information:

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

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

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

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

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

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

4.0 TRACEABILITY TO NIST

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

4.2 Balance Calibration

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

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

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

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

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

Page 2 of 4

INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

> uA M 882000.0

> 9A M 886 0.000.0

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

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

> iN O 882000.0 > sO 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 | 34500.0 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 Coth series alongs mirror and the constant and the country of the Coth series alongs mirror and the country of the Coth series alongs mirror and the country of the coth series alongs and the country of the coth series alongs and the coth series along the country of the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series and the coth series along the coth series along the coth series are considered as a series along the coth series alo

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.

Oliver			Intormation (ICP-OEC h	Jidoseo manda J
(weiv Isixs/Isib	as ra	are given	Estimated D.L.	Technique/Line
Terences (underline 4 :	Inter	Order	14q Pt	ICP-MS 48 amu
ferences (underlined indicates severe) 60, 32514N,	3281	A/N		
60180,				
7N2, 36Ar12C,	INDL			
Z=X96] 1	4009			
e X = Zr, Mo,	(wher			ICP-0FS 220 4F6
	I(ns	,	Jm/gu Se000.0 \ 4500.0	ICP-OES 334.941 nm
	Ce, Ai		Im/pu 8S0000.0 \ 8E00.0	ICE-OES 336.121 nm
ع. כ ר, ט	BI ,UVI			MIN 121,000 0=-
ره ره	oM, W		Jm/gq 450000.0 \ cooose	note: Inis standard shoul

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 it instructions in Sec 7.1 are not followed or if the CRWRM is damaged, confaminated, or otherwise modified.

Thomas Kozikowski Manager, Quality Control Certificate Approved By:

thibils Validity

- June 17, 2027 11.2 Lot Expiration Date

June 17, 2022 11.1 Certification Issue Date

Paul Gaines Certifying Officer:

0.Sr

0.11

CERTIFIED WEIGHT REPORT:

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



K S98 | Reference Material CRM | /24







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

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

1.0E6	5.0E5	m/z-> 5.0E4	2.5E4	m/z->	S.OES	\.\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
[1] Spectrum No.1		0		011		C
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ount] [Line		80		081		
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		2		170		
		990		-@ -		
		Oe		081		
		100		200		

Lot # 060724





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

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

	Se <0.2
(µg/mL)	Pr
-MS	
by ICP	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
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	B Ba

(T) = Target analyte

Physical Characterization:

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





2 of 2

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

All standard containers are meticulously cleaned prior to use.

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

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

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

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

CERTIFIED WEIGHT REPORT:

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



Certified Reference Mater



fied Refe	rence Mai	fied Reference Material CRM	C		ANAB IS AR-153 https://ab	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	dited
¥	Z #107	7	2	2/11/0	>		
Solvent:	Solvent: 24002546 Nitric Acid	Nitric Acid		A Company of the Comp	Ratio Andrea		
2%	40.0	Nitric Acid		Formulated By:	Benson Chan	031524	
	(III)			Ja Ja	Hento		
Uncertainty				Reviewed By:	Pedro L. Rentas	031524	

Part Number: Lot Number:		i d		Solvent:	Solvent: 24002546 Nitric Acid	Nitric Acid						
Description:	Strontium (Sr)	(Sr)		%	40.0	Nitric Acid		Formulated Bv:	Benson Chan	n management of the second	031524	
Expiration Date:	031527							1		95.00		
Recommended Storage:	Ambient (20 °C)	(2)						1	The state of the s	1		
Nominal Concentration (µg/mL):	1000							Jan	to then	Ą		
NIST Test Number:	6UTB		5E-05 Balar	5E-05 Balance Uncertainty				Reviewed By:	Pedro L. Rentas	ntas	031524	
Weight shown below was diluted to (mL); 2000.07	s diluted to (mL):	2000.07	0.100 Flask Uncertainty	Uncertainty								
								Expanded	SDS In	SDS Information		
	Lot	Nominal	Purity Unce	Nominal Purity Uncertainty Assay	Target	Actual	Actual	Uncertainty	(Solvent Safety Info. On Attached pg.)	nfo. On Attached	, pg.)	NIST
Compound	RM# Number Conc. (µg/mL) (%) Purity (%) (%)	Conc. (µg/mL)	(%) Puri	ty (%) (%)	Weight (g)	Weight (g)	Weight (g) Conc. (µg/mL) +/- (µg/mL)		CAS# OSHA PEL (TWA)	(TWA)	LD50	SRM

1. Strontium nitrate (Sr)		IN017 SHZ022018A1	1000	99.997	0.10	41.2	4.85470	4.85502	1000.1	2.0	10042-76-9	NA	orl-rat >2000mg/kg 3153a
5.0EG	[1] Spect	[1] Spectrum No.1	[14.495 sec]:58138.D# [Count] [Linear]	sec]:581	38.D#	Coun	it] [Linea						
2.5E6												**************************************	
m/z->> 1.0E6	T	10 20		O	0		.00	09	0,		80	- <u>0</u>	100
5.0ES													
m/z-≫ 5.0E6	The second of th	110 120		130	041		150	160	0.71		180	180	200
2.5E6													
V-z/E	· 'n	220		230	240	14	250	260					





Absolute Standards, Inc.

www.absolutestandards.com

800-368-1131



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

						Ī	Trace Me	etals	Verifica	tion	by ICP-I	ξS	(na/mr)						
Name of	THE RESIDENCE OF THE PERSON NAMED IN	MARKET STATES	WITH STATE OF	Section 1	Control of the last	SCHOOL STATE	The Section	THE REAL PROPERTY.	Service Company of the Party Company		Management of the last of the	Service of the last	в	William .	The state of the s	MANAGEMENT	SHARWARD CONTRACTOR		The second second second
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																		1	

(T) = Target analyte

Physical Characterization:

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



Certified by:

1. P

Lot # 031524

^{*} 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

5982 R: 6/11/24







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

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

Zirconyl chloride	1. Zirconyl chloride octahydrate (Zr)	58140	58140 070621	0.1000	200.0	0.084	1000	10000.3 1000.0		2.2	13520-92-8	NA	NA	¥ Z
7	[1] Spec	[1] Speatrum No.1		[41.153 sec]:57040.D# [Count] [Linear]	ec]:570	40.0# [Count (L	inear						
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ΰ	5.0E7													
K-2/LL		0 10	220	230		240	250	280						

Lot # 071423



Certified Reference Material CRM



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

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

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(T) = Target analyte

Physical Characterization:

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

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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







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

Lot # 071423

Part # 57040

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



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

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

m/z->	1.006	2.016	m/z->	N O	5.0E6	m/z->	1.1.1.	2.5E5	6-6	5.0E5	Aluminum nitrate nonahydrate (Al)	Compound	Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Fyniret	Des	Fan Lot	CERTIFIED WEIGHT REPORT:
210			110			10				[1] Spectrum No.1	11	RM#	below was dilut	Number:	(µg/mL):	Storage:	Evniration Data:	Description:	Fart Number:	
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Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 **ACCREDITATION / REGISTRATION**

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



2.0 PRODUCT DESCRIPTION

Product Code:

Multi Analyte Custom Grade Solution

Catalog Number:

IV-STOCK-12

Lot Number:

U2-MEB734294

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Barium, Bismuth, Cobalt, Lithium.

Lead,

Beryllium, Cerium, Indium,

Nickel. Uranium

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

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

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

Assay Information:

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

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

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

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

Characterization of CRM/RM by One Method

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

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

X_a = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

u_{char a} = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Certified Abundance:

IV's Certified Abundance

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 21, 2023

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

 Sealed TCT Bag Open Date 	o:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director

Paul R. Simo

Hydrochloric Acid, 36.5-38.0% BAKER INSTRA-ANALYZED® Reagent

For Trace Metal Analysis





R->10/13/24 Met dig

M 6121

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



M6125 Receive -> 11/22/24

CORCO CHEMICAL CORPORATION

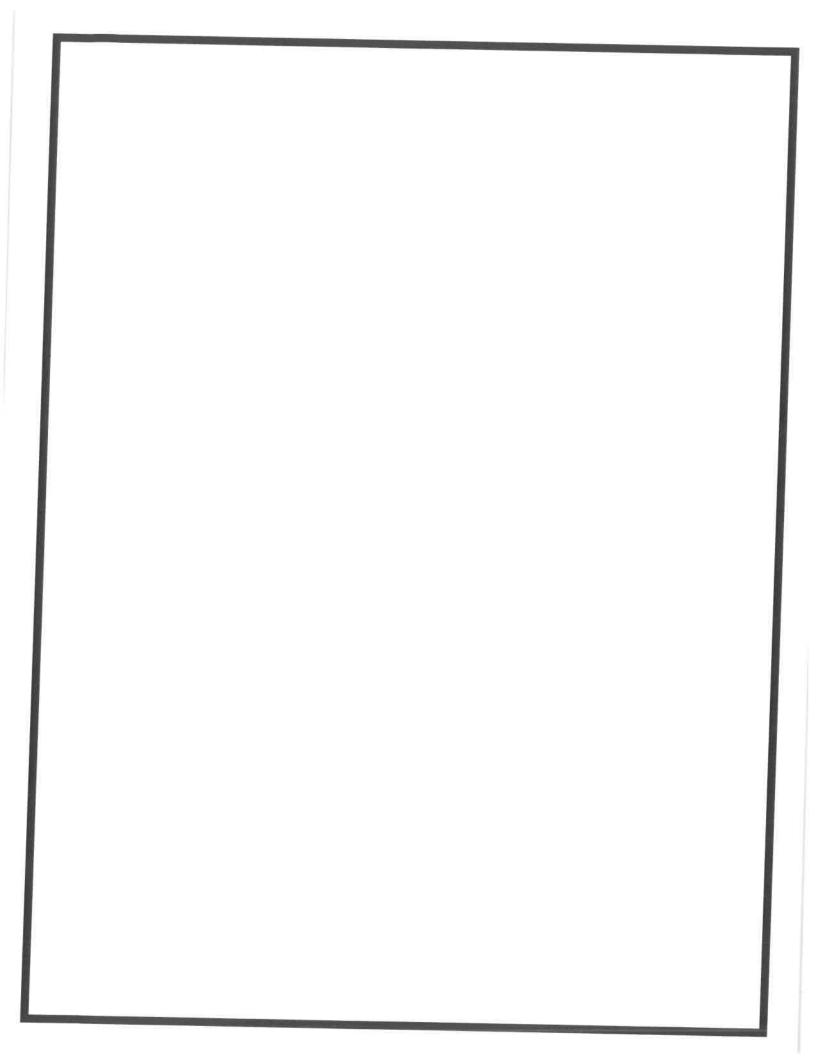
Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

Office and Plant 299 Cedar Lane Fairless Hills, PA 19030

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

Hydrogen Peroxide 30%, ACS Reagent Grade

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







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

800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT:

Part Number:

58111 122223

Sodium (Na)

Lot Number: Description:

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB 10000

Weight shown below was diluted to (mL):

3000.4

0.06 Flask Uncertainty 5E-05 Balance Uncertainty

RW#

Number Lot

Nominal

Purity

Uncertainty Assay Purity (%)

Target

Actual

8

38

Recommended Storage:

Ambient (20 °C)

122226

Expiration Date:

Lot # M5807

Solvent:

24002546 Nitric Acid

2%

60.0 (III)

Nitric Acid

Formulated By: 13827 P Aleah O'Brady Back

Reviewed By: Pedro L. Rentas

122223

22223

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

CAS#

SE

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

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

Part # 58111



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

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

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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
M5738 M5739 M5740 M5741 M5742

Refine your results. Redefine your industry.

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 **ACCREDITATION / REGISTRATION**

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



2.0 **PRODUCT DESCRIPTION**

Product Code:

Multi Analyte Custom Grade Solution

Catalog Number:

6020ISS

Lot Number:

S2-MEB709511

Matrix:

7% (v/v) HNO3

Value / Analyte(s):

10 µg/mL ea:

Bismuth,

Holmium,

Indium,

6-Lithium.

Rhodium,

Scandium,

Terbium,

Yttrium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

ANALYTE

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

Bismuth, Bi

Indium, In

10.00 ± 0.04 µg/mL

Holmium, Ho Rhodium, Rh

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

Scandlum, Sc

10.00 ± 0.04 µg/mL

Terbium, Tb

10.00 ± 0.04 µg/mL

Yttrium, Y

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

Density:

1.035 g/mL (measured at 20 \pm 4 °C)

Assay Information:

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

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

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

Certified Abundance:

IV's Certified Abundance

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 03, 2021

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

11.2 Lot Expiration Date

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

11.3 Period of Validity

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Michael Booth Director, Quality Control Michael 2 Both

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

RD: 07/14/2022

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

Instructions for QATS Reference Material: ICP-MS ICS

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

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

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

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

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

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





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

Instructions for QATS Reference Material: ICP-MS ICS

ICSB: M5874

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

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

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

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

ICSA: M5873

	Table 1.		VALUES" FOI 303, AND ICSA				MS
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)
Al	20.0	[100000]			[100000]		
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0
As	1.0	(0.1)	-1.9	2.1	19.0	16.2	21.9
Ba	10.0	(1.2)	-18.8	21.2	(22.0)	2.0	42.0
Be	1.0	(0)	-2.0	2.0	19.0	16.2	21.9
Cd	1.0	(0.7)	-1.3	2.7	20.0	17.0	23.0
Ca	500	[100000]			[100000]		
С		[200000]			[200000]		
CI		[1000000]			[1000000]		
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0
Co	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0
Fe	200	[100000]			[100000]		
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8
Mg	500	[100000]			[100000]		
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1
Мо		[2000]			[2000]		
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6
Р		[100000]			[100000]		
K	500	[100000]			[100000]		
Se	5.0	(0.3)	-9.7	10.3	(19.0)	9.0	29.0
Ag	1.0	(0)	-2.0	2.0	18.0	15.3	20.7
Na	500	[100000]			[100000]		
S		[100000]			[100000]		
TI	1.0	(0)	-2.0	2.0	21.0	17.9	24.2
Ti		[2000]			[2000]		
V	5.0	(0.5)	-9.5	10.5	(19.0)	9.0	29.0
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0

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

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

RD: 07/14/2022

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

Instructions for QATS Reference Material: ICP-MS ICS

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

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

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

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

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

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

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

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

(C) ANALYSIS OF SAMPLES

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





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

Instructions for QATS Reference Material: ICP-MS ICS

ICSB: M5874

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

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

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

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

ICSA: M5873

	Table 1.		VALUES" FOI 303, AND ICSA				MS
Element	CRQL	Part A (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)	Part A +Part B (µg/L)	Lower Limit (µg/L)	Upper Limit (µg/L)
Al	20.0	[100000]			[100000]		
Sb	2.0	(1.5)	-2.5	5.5	(22.0)	18.0	26.0
As	1.0	(0.1)	-1.9	2.1	19.0	16.2	21.9
Ba	10.0	(1.2)	-18.8	21.2	(22.0)	2.0	42.0
Be	1.0	(0)	-2.0	2.0	19.0	16.2	21.9
Cd	1.0	(0.7)	-1.3	2.7	20.0	17.0	23.0
Ca	500	[100000]			[100000]		
С		[200000]			[200000]		
CI		[1000000]			[1000000]		
Cr	2.0	(21.0)	17.0	25.0	40.0	34.0	46.0
Co	1.0	(1.0)	-1.0	3.0	20.0	17.0	23.0
Cu	2.0	(8.0)	4.0	12.0	(25.0)	21.0	29.0
Fe	200	[100000]			[100000]		
Pb	1.0	(4.0)	2.0	6.0	25.0	21.3	28.8
Mg	500	[100000]			[100000]		
Mn	1.0	(7.0)	5.0	9.0	27.0	23.0	31.1
Мо		[2000]			[2000]		
Ni	1.0	(6.0)	4.0	8.0	24.0	20.4	27.6
Р		[100000]			[100000]		
K	500	[100000]			[100000]		
Se	5.0	(0.3)	-9.7	10.3	(19.0)	9.0	29.0
Ag	1.0	(0)	-2.0	2.0	18.0	15.3	20.7
Na	500	[100000]			[100000]		
S		[100000]			[100000]		
TI	1.0	(0)	-2.0	2.0	21.0	17.9	24.2
Ti		[2000]			[2000]		
V	5.0	(0.5)	-9.5	10.5	(19.0)	9.0	29.0
Zn	5.0	(11.0)	1.0	21.0	(29.0)	19.0	39.0

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

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

www.absolutestandards.com



Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: 57051 120523 BTU9 1000 120526 Ambient (20 °C) Antimony (Sb) 3000.41 0.058 5E-05 Flask Uncertainty Balance Uncertainty 24002546 Lot # 2.0% M.5802 Nitric Acid Solvent: 0.00 MSBOS Nitric Acid Formulated By: Reviewed By: Pedro L. Rentas Lawrence Barry 120523 120523

1. Antimony (Sb)

58151

100923

0.1000

300.0

1000

10001.4

1000.0

7440-36-0

0.5 mg/m3

orl-rat 7000 mg/kg 3102a

Number Part

Number Ď

Vol. (ml.)

Pipette (ml.) Conc. (µg/ml.)

Conc. (µg/mL)

Conc. (µg/ml.)

+/- (µg/mt.) Uncertainty Expanded

CAS#

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

LD50

SRM NIST SDS Information

Final

Dilution Factor

Initial

Uncertainty

Nominal

Compound

-2/m	1.057	m/z-> 2.0E7	2. 6 8	5.0E5	2.0 E	6.OE6
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Part # 57051



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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(1) = Target analyte

Physical Characterization:

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

Certified by:

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

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

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

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

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

Part # 57051

Lot # 120523

Certified Reference Material CRM

M6030



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

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www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

800-368-1131

Absolute Standards, Inc.

Part Number: Solvent: 24002546 Lot # Nitric Acid

Lot Number: Description: 57047 122823 Silver (Ag)

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

Weight shown below was diluted to (mL): 4000.30

Silver nitrate (Ag)

IN035 J0612AGA1

1000.0

0.10

63.7

6.27992

6.27998

1000.0

2.0

7761-88-B

10 ug/m3

Z

3151

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

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

Formulated By:

Benson Chan

122823

122823

Reviewed By: Pedro L. Rentas

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

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

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							race Me	letals	Verificat	tion	by ICP-I	S	ug/mL)						
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Ве	40.01	Ω	<0.02	හු	<0.02	ਲੋਂ	40.2	Hg	40.2	Þ	40.02	R	A0.02	Ž,	40,02	ď	♦ 0.02	<	40.02
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Physical Characterization:

(T)= Target analyte

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

Certified by:

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- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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- Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
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Certified Reference Material CRM

MS473 MS474 MS475

Nitric Acid

Solvent: 20510011

Lot #



Absolute Standards, Inc.

www.absolutestandards.com

Strontium (Sr) 082922 56138

> Lot Number: Description:

Part Number:

CERTIFIED WEIGHT REPORT:

Ambient (20 °C) 082925

Expiration Date:

10000 Recommended Storage: Nominal Concentration (µg/mL):

6UTB NIST Test Number:

Suran

Pedro L. Rentas Reviewed By:

082922

082922

Lawrence Barry

Formulated By:

Nitric Acid

20.0 (mL)

%

5E-05 Balance Uncertainty 0.058 Flask Uncertainty 1000.12 Weight shown below was diluted to (mL):

Expanded Uncertainty Actual

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

OSHA PEL (TWA)

NIST SRM

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

ž 10042-76-9 20.0

orl-rat >2000mg/kg 3153a LD50

100001 24.2758 [14.495 sec]:58138.D# [Count] [Linear] 24.2756 41.2 0.10 99.997 10000 IN017 SRZ022018A1 [1] Spectrum No.1

Weight (g)

8

Purity (%)

8

Conc. (µg/mL)

Number

RM#

5.0E6

Strontium nitrate (Sr)

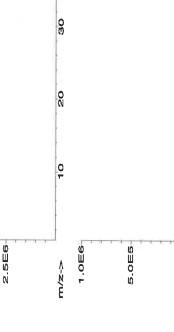
Compound

Nominal

Ę

Target

Purity Uncertainty Assay



100

06

80

0

80

50

04

200

190

180

170

160

150

140

130 120 110

W/z->

5.0E6 2.5E6

210 ~-z/w 1 of 2

260

250

240

230

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

Lot # 082922

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

Al <a. colspan="8"> Cd <a. colspan="8"> Al <a. colspan="8"><a. colspan="8"><a.< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Trace Me</th><th>detals</th><th>Verification</th><th>tion</th><th>by ICP-N</th><th>MS (</th><th>(Jm/b/)</th><th></th><th></th><th></th><th></th><th></th><th></th></a.<></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.></a.>								Trace Me	detals	Verification	tion	by ICP-N	MS ((Jm/b/)						
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(T)= Target analyte

Physical Characterization:

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



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Absolute Standards, Inc. 800-368-1131

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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

-z/m	5.0E5	1.0E6	m/z->	5000	1.0€4	1.0E6	2.0E6	
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220			120		N O			
							4 0	
230			130		9		[]4.044 sec]:57081.D# [Count] [Linear]	
240			<u> </u>		4		57081.	
ō			140		40		<u> </u>	
250			1		OI.			
0			160		60			
			4		70			
			170		0			
			180		80			100
			190		90			or any
			200		100			
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								0

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:

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Certified Reference Material CRM

M6021

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

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

Nitric Acid

Ambient (20 °C) 2.0% (III) 40.0

Formulated By:

Aleah O'Brady

062424

ASSET O DE LONG

Recommended Storage:

Expiration Date:

062427

Description:

Vanadium (V)

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

Pedro L. Rentas

062424

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

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

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:

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