

Prep Standard - Chemical Standard Summary

Order ID : Q1984

Test : Mercury, Metals ICP-TAL

Prepbatch ID : PB167931,PB167938,

Sequence ID/Qc Batch ID: LB135733,LB135855,LB135868,

Standard ID :

MP837,MP84041,MP85241,MP85243,MP85545,MP85546,MP85547,MP85548,MP85549,MP85551,MP85552,MP85553,MP855554,MP855556,MP85557,MP85558,MP85625,MP85626,MP85627,MP85628,MP85630,MP85631,MP85632,MP85633,MP85634,MP85636,MP85638,MP85646,

Chemical ID :

M4251,M4583,M4916,M5062,M5429,M5466,M5467,M5470,M5471,M5581,M5658,M5747,M5748,M5751,M5798,M5799 ,M5800,M5801,M5811,M5814,M5815,M5816,M5817,M5820,M5875,M5882,M5884,M5942,M5959,M5962,M5970,M5985 ,M5997,M6005,M6016,M6021,M6023,M6028,M6030,M6032,M6058,M6076,M6077,M6125,M6126,M6127,M6128,M613 7,M6138,M6142,M6144,M6145,M6146,M6150,M6151,M6152,M6155,M6158,M6159,M6161,W 3112,



| <u>Recipe</u> <u>ID</u> 169 | NAME 1:1HNO3 | <u>NO.</u> MP84041 | Prep Date 01/14/2025 | | <u>Prepared</u> <u>By</u> Eman Mughal | <u>ScaleID</u> None | <u>PipetteID</u> None | Sarabjit Jaswal 01/16/2025 |
|-----------------------------------|-----------------------------------|-----------------------|-------------------------|------------------|---|------------------------|--------------------------|-------------------------------|
| FROM | 1250.00000ml of M6126 + 1250.0000 | 00ml of W31 | 12 = Final Q | uantity: 2500.00 | 00 ml | | | |
| Besine | | | | Funitation | Durant | | | Ourservice of Du |

| Recipe | | | | Expiration | <u>Prepared</u> | | | Supervised By |
|---------------|----------------------------------|----------------|----------------|-------------------|-----------------|----------------|-----------|-----------------|
| ID | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipettelD | Sarabjit Jaswal |
| 65 | POTASSIUM PERMANGANATE | <u>MP85241</u> | 04/16/2025 | 10/16/2025 | Mohan Bera | METALS_SCA | | |
| | SOLUTION 5 % | | | | | LE_3 (M SC-3) | | 04/29/2025 |
| FROM | 100.00000gram of M4916 + 2000.00 | 000ml of W | 3112 = Final (| Quantity: 2000. | 000 ml | | | |
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| Recipe ID 67 FROM | NAME SODIUM CHLORIDE - HYDROXYL- CHLORIDE SOLUTION 2000.00000ml of W3112 + 240.0000 | <u>NO.</u> MP85243 | Prep Date 04/16/2025 1251 + 240.00 | Expiration Date 06/25/2025 000gram of M5 | | ScaleID METALS_SCA LE_3 (M SC-3) Jantity: 2000.000 | | Sarabjit Jaswal 04/29/2025 |
|----------------------------|---|------------------------------|--|---|--------------------------|---|-------------|-------------------------------|
| Recipe | | | | Expiration | Prepared | | | Supervised By |
| <u>ID</u> 902 | NAME | <u>NO.</u> <u>MP85545</u> | <u>Prep Date</u> 05/02/2025 | <u>Date</u> 06/02/2025 | <u>By</u> Janvi Patel | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | Sarabjit Jaswal 05/07/2025 |
| FROM | 125.00000ml of M6151 + 2350.0000 | Oml of W311 | 2 + 25.00000 | ml of M6158 = | Final Quantity: | 2500.000 ml | A) ' | |



| <u>Recipe</u> <u>ID</u> 907 | NAME ICP AES STD S (S5) | <u>NO.</u> <u>MP85546</u> | Prep Date 05/02/2025 | | | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | |
|-----------------------------------|---|------------------------------|-------------------------|------------|------------|---|-------------|-----------------|
| FROM | 5.00000ml of M5466 + 5.00000ml of of M5970 + 5.00000ml of M5997 + 5. 500.000 ml | | | | | | | |
| Desire | | | | Enviration | Ducucaucid | | | Currentia ed Du |

| <u>Recipe</u> | | | | Expiration | Prepared | | | Supervised By |
|---------------|----------------------------------|----------------|---------------|-----------------|-----------|----------------|-------------|-----------------|
| ID | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipetteID | Sarabjit Jaswal |
| 910 | ICP AES STD S4 | <u>MP85547</u> | 05/02/2025 | 06/02/2025 | | METALS_SCA | | |
| | | | | | | LE_3 (M SC-3) | ETTE_1 (ICP | 05/07/2025 |
| FROM | 50.00000ml of MP85545 + 50.00000 | ml of MP85 | 546 = Final Q | uantity: 100.00 | 0 ml | | ~) | |
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| <u>Recipe</u> <u>ID</u> 909 | NAME ICP AES STD S3 | <u>NO.</u> MP85548 | Prep Date 05/02/2025 | Expiration Date 06/02/2025 | | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | |
|-----------------------------------|----------------------------------|-----------------------|-------------------------|----------------------------------|----------|---|-------------|---------------|
| <u>FROM</u> | 25.00000ml of MP85546 + 75.00000 | ml of MP855 | 545 = Final Q | uantity: 100.00 | 0 ml | | A) | |
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| Desine | | | | Evairation | Drenered | | | Supervised By |

| Recipe | | | | Expiration | Prepared | | | Supervised By |
|---------------|----------------------------------|----------------|--------------|-----------------|-----------------|----------------|------------------|-----------------|
| <u>ID</u> | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | <u>PipetteID</u> | Sarabjit Jaswal |
| 3913 | ICP AES STD S2 | <u>MP85549</u> | 05/02/2025 | 06/02/2025 | | METALS_SCA | | |
| | | | | | | LE_3 (M SC-3) | ETTE_1 (ICP | 05/07/2025 |
| FROM | 16.00000ml of MP85546 + 184.0000 | 0ml of MP8 | 5545 = Final | Quantity: 200.0 | 00 ml | | A) | |
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| Recipe ID 2950 | NAME ICP AES S1/CRI STOCK STD | <u>NO.</u> MP85551 | Prep Date 05/02/2025 | Expiration Date 06/02/2025 | <u>Prepared</u> <u>By</u> Janvi Patel | <u>ScaleID</u> METALS_SCA LE_2 (M SC-2) | ETTE_1 (ICP | Sarabjit Jaswal |
|----------------------|---|--|--|--|--|--|--|----------------------------|
| FROM | 0.03000ml of M5798 + 0.03000ml of of M6030 + 0.05000ml of M6159 + 0. 0.10000ml of M5820 + 0.10000ml of of M5748 + 0.20000ml of M5799 + 0. 0.25000ml of M6146 + 0.50000ml of of M6138 + 1.00000ml of M6142 + 1. 100.000 ml | .06000ml of M5962 + 0. .20000ml of M5814 + 0. | M5747 + 0.10 10000ml of M M6021 + 0.20 50000ml of M | 0000ml of M547 5970 + 0.10000 0000ml of M602 6032 + 1.00000 | 71 + 0.10000ml 0ml of M6128 + 23 + 0.20000ml 0ml of M5942 + | of M5751 + 0.1 0.15000ml of M of M6145 + 0.2 1.00000ml of M | 0000ml of M58 5800 + 0.2000 5000ml of M54 6127 + 1.0000 | 01 + 0ml 66 + 0ml |

| Recipe | | | | Expiration | Prepared | | | Supervised By |
|-----------|----------------------------------|----------------|---------------|-----------------|-----------|----------------|-----------|-----------------|
| <u>ID</u> | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipetteID | Sarabjit Jaswal |
| 2951 | ICP AES S1/CRI WORK STD | <u>MP85552</u> | 05/02/2025 | 06/02/2025 | | METALS_SCA | | |
| | | | | | | LE_3 (M SC-3) | | 05/07/2025 |
| FROM | 2.00000ml of MP85551 + 98.00000m | nl of MP855₄ | 45 = Final Qu | antity: 100.000 | ml | | A) | |
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| <u>Recipe</u> <u>ID</u> 912 | NAME ICP AES ICV SOLN | <u>NO.</u> MP85553 | Prep Date 05/02/2025 | Expiration Date 06/02/2025 | | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | |
|-----------------------------------|---|-----------------------|-------------------------|----------------------------------|----------|---|---------------------|-----------------|
| FROM | 0.02500ml of M5429 + 0.02500ml of of M6058 + 10.00000ml of M6150 + 8 | | | | | 0.25000ml of M | A) 5470 + 0.2500 | 00ml |
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| Desire | | | | Function | Durana d | | | Currentine d Du |

| Recipe | | | | Expiration | <u>Prepared</u> | | | Supervised By |
|---------------|----------------------------------|----------------|--------------|-----------------|-----------------|----------------|-----------|-----------------|
| ID | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipettelD | Sarabjit Jaswal |
| 904 | ICP AES ICSA SOLN | <u>MP85554</u> | 05/02/2025 | 06/02/2025 | Janvi Patel | METALS_SCA | | - |
| | | | | | | LE_3 (M SC-3) | | 05/07/2025 |
| FROM | 25.00000ml of M6152 + 225.00000m | l of MP8554 | 5 = Final Qu | antity: 250.000 | ml | | A) | |
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| Recipe ID 3494 | NAME ICP AES ICSAB SOLN-1 | <u>NO.</u> <u>MP85555</u> | Prep Date 05/02/2025 | Expiration Date 06/02/2025 | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | |
|----------------------|---|------------------------------|-------------------------|----------------------------------|---|---------------------|-------|
| FROM | 0.01000ml of M5815 + 0.01000ml of of M6152 + 10.00000ml of M6155 + 7 | | | | 0.10000ml of M | A) 6077 + 10.000 | 100ml |
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| Recipe | | | | Expiration | Prepared | | | Supervised By |
|---------------|----------------------------------|----------------|---------------|-------------------|-----------|----------------|-------------------|-----------------|
| ID | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipetteID | Sarabjit Jaswal |
| 911 | ICP AES CCV SOLN | <u>MP85556</u> | 05/02/2025 | 06/02/2025 | | METALS_SCA | | |
| | | | | | | LE_3 (M SC-3) | ETTE_1 (ICP A) | 05/07/2025 |
| FROM | 50.00000ml of MP85545 + 50.00000 | ml of MP85 | 546 = Final Q | uantity: 100.00 | 0 ml | | A) | |
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| <u>Recipe</u> <u>ID</u> 919 | NAME ICP AES INTERNAL STD | <u>NO.</u> MP85557 | Prep Date 05/02/2025 | Expiration Date 06/02/2025 | | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | ETTE_1 (ICP | |
|-----------------------------------|-----------------------------------|-----------------------|-------------------------|----------------------------------|-----------------|---|-----------------------|---------------|
| <u>FROM</u> | 1.00000ml of M5959 + 10.00000ml o | f M5985 + 1 | 969.00000ml | of W3112 + 20 | .00000ml of M6 | i158 = Final Qu | A) antity: 2000.00 | |
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| Recipe | | | | Expiration | <u>Prepared</u> | | | Supervised By |

| Recipe | | | | Expiration | <u>Prepared</u> | | | <u>Supervised By</u> |
|---------------|----------------------------------|----------------|---------------|-------------------|-----------------|----------------|------------------|----------------------|
| <u>ID</u> | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | <u>PipetteID</u> | Sarabjit Jaswal |
| 903 | ICP AES RINSE SOLN | <u>MP85558</u> | 05/02/2025 | 06/02/2025 | | METALS_SCA | | - |
| | | | | | | LE_3 (M SC-3) | | 05/07/2025 |
| FROM | 200.00000ml of M6158 + 9800.0000 | 0ml of W311 | 2 = Final Qua | antity: 10000.00 | 00 ml | | A) | |
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| Recipe ID 871 | NAME MERCURY INTERMEDIATE B 250PPB WORKING STD. | <u>NO.</u> MP85625 | Prep Date 05/09/2025 | Expiration Date 05/10/2025 | Prepared By Mohan Bera | <u>ScaleID</u> None | PipettelD METALS_PIP ETTE_5 (HG | |
|---------------------|---|-----------------------|-------------------------|----------------------------------|------------------------------|------------------------|---------------------------------------|--|
| <u>FROM</u> | 1.00000ml of M6158 + 2.50000ml of | M5062 + 96 | 50000ml of V | V3112 = Final | Quantity: 100.00 | 00 ml | A) | |
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| Recipe | | | | Expiration | Prepared | | | Supervised By |
|-----------|----------------------------------|----------------|---------------|----------------|------------|----------------|------------|-----------------|
| <u>ID</u> | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipettelD | Sarabjit Jaswal |
| 1340 | Hg 0.00 PPB STD | <u>MP85626</u> | 05/09/2025 | 05/10/2025 | Mohan Bera | None | METALS_PIP | |
| | | | | | | | ETTE_5 (HG | 05/09/2025 |
| FROM | 2.50000ml of M6158 + 247.50000ml | of W3112 = | Final Quantit | ty: 250.000 ml | | | A) | |
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| Recipe ID 1341 FROM | NAME Hg 0.2 PPB STD 2.50000ml of M6158 + 247.30000ml | <u>NO.</u> <u>MP85627</u> of W3112 + | Prep Date 05/09/2025 0.20000ml of | Expiration Date 05/10/2025 MP85625 = F | Prepared By Mohan Bera inal Quantity: 25 | ScaleID None | PipettelD METALS_PIP ETTE_5 (HG A) | Sarabjit Jaswal 05/09/2025 |
|------------------------------|--|--|---|---|---|-------------------|---|---|
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| <u>Recipe</u> <u>ID</u> | NAME | <u>NO.</u> | Prep Date | Expiration Date | Prepared By | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> Sarabjit Jaswal |
| 1342 <u>FROM</u> | Hg 2.5 PPB STD 2.50000ml of M6158 + 245.00000ml | MP85628 of W3112 + | 05/09/2025 2.50000ml of | 05/10/2025 MP85625 = F | Mohan Bera inal Quantity: 25 | None 50.000 ml | METALS_PIP ETTE_5 (HG A) | 05/09/2025 |



| Recipe ID 1343 FROM | NAME Hg 5.0 PPB STD 2.50000ml of M6158 + 242.50000ml | <u>NO.</u> <u>MP85629</u> of W3112 + | Prep Date 05/09/2025 5.00000ml of | Expiration Date 05/10/2025 MP85625 = F | Prepared By Mohan Bera inal Quantity: 25 | <u>ScaleID</u> None | PipettelD METALS_PIP ETTE_5 (HG A) | Sarabjit Jaswal 05/09/2025 |
|------------------------------|--|--|---|---|---|------------------------|---|---|
| Recipe ID | NAME | <u>NO.</u> | Prep Date | Expiration Date | Prepared By | ScaleID | PipettelD | <u>Supervised By</u> Sarabjit Jaswal |
| 1344 <u>FROM</u> | Hg 7.5 PPB STD 2.50000ml of M6158 + 240.00000ml | MP85630 of W3112 + | 05/09/2025 7.50000ml of | 05/10/2025 MP85625 = F | Mohan Bera inal Quantity: 25 | None | METALS_PIP ETTE_5 (HG A) | 05/09/2025 |



| <u>Recipe</u> <u>ID</u> 1345 | NAME Hg 10.0 PPB STD | <u>NO.</u> MP85631 | Prep Date 05/09/2025 | Expiration Date 05/10/2025 | Prepared By Mohan Bera | <u>ScaleID</u> None | PipetteID METALS_PIP ETTE_5 (HG | Sarabjit Jaswal |
|------------------------------------|----------------------------------|-----------------------|-------------------------|----------------------------------|------------------------------|------------------------|---------------------------------------|---|
| FROM | 2.50000ml of M6158 + 237.50000ml | of W3112 + | 10.00000ml c | of MP85625 = | Final Quantity: 2 | 250.000 ml | <u>A)</u> | |
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| <u>Recipe</u> <u>ID</u> | NAME | <u>NO.</u> | Prep Date | Expiration Date | Prepared By | <u>ScaleID</u> | PipettelD | <u>Supervised By</u> Sarabjit Jaswal |

| ID | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipettelD | Sarabjit Jaswal |
|------|----------------------------------|----------------|--------------|--------------|------------------|----------------|------------|-----------------|
| 1346 | Hg ICV SOLUTION | <u>MP85632</u> | 05/09/2025 | 05/10/2025 | Mohan Bera | None | METALS_PIP | - |
| | | | | | | | ETTE_5 (HG | 05/09/2025 |
| FRO | 2.50000ml of M6158 + 2.50000ml o | M6161 + 24 | 5.00000ml of | W3112 = Fina | I Quantity: 250. | 000 ml | A) | |
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| <u>Recipe</u> <u>ID</u> 1351 | NAME ICB (Hg 0.00 PPB SOLUTION) | <u>NO.</u> MP85633 | Prep Date 05/09/2025 | Expiration Date 05/10/2025 | <u>Prepared</u> <u>By</u> Mohan Bera | <u>ScaleID</u> None | PipettelD METALS_PIP ETTE_5 (HG A) | |
|------------------------------------|------------------------------------|-----------------------|--------------------------------|----------------------------------|--|------------------------|---|---------------|
| <u>FROM</u> | 2.50000ml of M6158 + 247.50000ml | of W3112 = | Final Quantit | y: 250.000 ml | | | ~) | |
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| <u>Recipe</u> ID | NAME | NO. | Prep Date | Expiration Date | <u>Prepared</u> By | ScaleID | PipettelD | Supervised By |

| Recipe | | | | Expiration | Prepared | | | <u>Supervised By</u> | | |
|---------------|---|----------------|------------|-------------------|-----------------|----------------|------------------|----------------------|--|--|
| <u>ID</u> | NAME | <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) | <u>MP85634</u> | 05/09/2025 | 05/10/2025 | Mohan Bera | None | METALS_PIP | | | |
| | | | | | | | ETTE_5 (HG | 05/09/2025 | | |
| FROM | FROM 485.00000ml of W3112 + 5.00000ml of M6158 + 10.00000ml of MP85625 = Final Quantity: 500.000 ml | | | | | | | | | |
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| <u>Recipe</u> <u>ID</u> 1349 | NAME CRA/CRI (Hg 0.2 PPB SOLUTION) | <u>NO.</u> MP85636 | Prep Date 05/09/2025 | Expiration Date 05/10/2025 | Prepared By Mohan Bera | <u>ScaleID</u> None | PipettelD METALS_PIP ETTE_5 (HG | |
|------------------------------------|--|-----------------------|-------------------------|----------------------------------|------------------------------|------------------------|---------------------------------------|---------------|
| FROM | 2.50000ml of M6158 + 247.30000ml | of W3112 + | 0.20000ml of | MP85625 = F | nal Quantity: 2 | 50.000 ml | A) | |
| Decine | | | | Evaluation | Dranarad | | | Supervised By |

| Recipe | | | | Expiration | Prepared | | | Supervised By |
|---------------|----------------------------------|----------------|---------------|-----------------|------------|----------------|------------|-----------------|
| <u>ID</u> | NAME | <u>NO.</u> | Prep Date | <u>Date</u> | <u>By</u> | <u>ScaleID</u> | PipettelD | Sarabjit Jaswal |
| 887 | AQUA REGIA FOR HG ON 7471A | <u>MP85638</u> | 05/09/2025 | 05/10/2025 | Mohan Bera | None | METALS_PIP | |
| | | | | | | | ETTE_5 (HG | 05/09/2025 |
| FROM | 150.00000ml of M6151 + 50.00000m | l of M6158 | = Final Quant | tity: 200.000 m | I | | A) | |
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| Recipe ID 68 | NAME STANNOUS CHLORIDE SOLUTION | <u>NO.</u> MP85646 | Prep Date 05/12/2025 | Expiration Date 05/13/2025 | | <u>ScaleID</u> METALS_SCA LE_3 (M SC-3) | Sarabjit Jaswal |
|--------------------|---------------------------------------|-----------------------|-------------------------|----------------------------------|-----------------|---|-----------------|
| <u>FROM</u> | 450.00000ml of W3112 + 50.00000gi | ram of M588 | 32 + 50.00000 | ml of M6151 = | Final Quantity: | 500.000 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 | 12/19/2018 / mohan | 12/05/2018 / mohan | M4251 |
| 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. | 57103 / Li, 10000 PPM, 125 ml | 070622 | 07/06/2025 | 01/30/2023 / bin | 01/26/2023 / bin | M5429 |
| | | | Expiration | Data Onened / | Pacaivad Data / | Chomtoch |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|-----------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57058 / Cerium, 1000PPM, 100ML | 061322 | 06/13/2025 | 03/06/2023 / bin | 03/01/2023 / bin | M5466 |



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| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------------|---|---------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57058 / Cerium, 1000PPM, 100ML | 020623 | 02/06/2026 | 03/06/2023 / bin | 03/01/2023 / bin | M5467 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57038 / Sr, 1000 PPM, 125 ml | 082922 | 08/29/2025 | 04/14/2025 / jaswal | 03/16/2023 / jaswal | M5470 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57038 / Sr, 1000 PPM, 125 ml | 082922 | 08/29/2025 | 04/14/2025 / jaswal | 03/16/2023 / jaswal | M5471 |
| 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 | 03/20/2026 | 03/20/2025 / jaswal | 06/12/2023 / jaswal | M5581 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 58024 / Chromium, Cr, 500 ml, 1000 PPM | 060523 | 06/05/2026 | 08/28/2023 / jaswal | 08/25/2023 / jaswal | M5658 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | / Lead (Pb) 1000PPM | 100923 | 10/09/2026 | 05/20/2024 / Jaswal | 12/20/2023 / jaswal | M5747 |



| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | / Nickel (Ni) 1000PPM | 091223 | 09/12/2026 | 01/02/2024 / bin | 12/20/2023 / jaswal | M5748 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 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. | 57004 / Be, 1000 PPM, 125 ml | 102523 | 10/25/2026 | 02/09/2024 / bin | 02/09/2024 / bin | M5798 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57050 / Sn, 1000 PPM, 125 ml | 071123 | 07/11/2026 | 02/09/2024 / bin | 02/09/2024 / bin | M5799 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57027 / CO, 1000 PPM, 125 ml | 091923 | 09/19/2026 | 05/31/2024 / bin | 02/09/2024 / bin | M5800 |
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| 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 |



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CHEMICAL RECEIPT LOG BOOK

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| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|----------------------------------|--|--|--|---|--|
| 58126 / Fe, 10000 PPM, 500 ml | 051523 | 05/15/2026 | 02/06/2025 / kareem | 01/03/2024 / jaswal | M5811 |
| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 57005 / B, 1000 PPM, 125 ml | 071123 | 07/11/2026 | 03/26/2024 / Sohil | 01/03/2024 / jaswal | M5814 |
| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 57115 / P, 10000 PPM, 125 ml | 041723 | 04/17/2026 | 05/21/2024 / Jaswal | 02/09/2024 / jaswal | M5815 |
| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 57016 / S, 1000 PPM, 125 ml | 122923 | 12/29/2026 | 05/20/2024 / Jaswal | 02/09/2024 / jaswal | M5816 |
| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 57116 / S, 10000 PPM, 125 ml | 071123 | 07/11/2026 | 03/01/2024 / jaswal | 02/09/2024 / jaswal | M5817 |
| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 57015 / P, 1000 PPM, 125 | 091123 | 09/11/2026 | 05/01/2024 / jaswal | 02/09/2024 / jaswal | M5820 |
| | 58126 / Fe, 10000 PPM, 500 ml ItemCode / ItemName 57005 / B, 1000 PPM, 125 ml ItemCode / ItemName 57115 / P, 10000 PPM, 125 ml ItemCode / ItemName 57016 / S, 1000 PPM, 125 ml ItemCode / ItemName 57016 / S, 1000 PPM, 125 ml ItemCode / ItemName ItemCode / ItemName | ItemCode / ItemName Lot # 58126 / Fe, 10000 PPM, 500 ml 051523 ItemCode / ItemName Lot # 57005 / B, 1000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57115 / P, 10000 PPM, 125 ml 041723 ItemCode / ItemName Lot # 57016 / S, 1000 PPM, 125 ml 122923 ItemCode / ItemName Lot # 57116 / S, 10000 PPM, 125 ml 071123 ItemCode / ItemName Lot # 57116 / S, 10000 PPM, 125 ml 071123 ItemCode / ItemName Lot # ItemCode / ItemName Lot # ItemCode / ItemName Lot # | ItemCode / ItemName Lot # Date 58126 / Fe, 10000 PPM, 500 ml 051523 05/15/2026 ItemCode / ItemName Lot # Expiration Date 57005 / B, 1000 PPM, 125 ml 071123 07/11/2026 ItemCode / ItemName Lot # Expiration Date 57115 / P, 10000 PPM, 125 ml 041723 04/17/2026 ItemCode / ItemName Lot # Expiration Date 57016 / S, 1000 PPM, 125 ml 122923 12/29/2026 ItemCode / ItemName Lot # Expiration Date 57116 / S, 1000 PPM, 125 ml 122923 12/29/2026 ItemCode / ItemName Lot # Expiration Date 57116 / S, 10000 PPM, 125 ml 07/1123 07/11/2026 ItemCode / ItemName Lot # Expiration Date ItemCode / ItemName Lot # Expiration Date | ItemCode / ItemNameLot #DateOpened By58126 / Fe, 10000 PPM, 500 ml05/152305/15/202602/06/2025 / kareemItemCode / ItemNameLot #Expiration DateDate Opened / Opened By57005 / B, 1000 PPM, 125 ml07112307/11/202603/26/2024 / SohilitemCode / ItemNameLot #Expiration DateDate Opened / Opened By57105 / B, 1000 PPM, 125 ml07112307/11/202603/26/2024 / SohilitemCode / ItemNameLot #Expiration DateDate Opened / Opened By57115 / P, 10000 PPM, 125 ml04/172304/17/202605/21/2024 / JaswalitemCode / ItemNameLot #Expiration DateDate Opened / Opened By57016 / S, 1000 PPM, 125 ml12292312/29/202605/20/2024 / JaswalitemCode / ItemNameLot #Expiration DateDate Opened / Opened By57116 / S, 10000 PPM, 125 ml07112307/11/202603/01/2024 / JaswalitemCode / ItemNameLot #Expiration DateO3/01/2024 / JaswalitemCode / ItemNameLot #Expiration DateO3/01/2024 / Jaswal | ItemCode / ItemName Lot # Date Opened By Received By 58126 / Fe, 10000 PPM, 500 ml 051523 05/15/2026 02/06/2025 / kareem 01/03/2024 / jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Sohil ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Opened By ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Received By 57115 / P, 10000 PPM, 125 ml 041723 04/17/2026 05/21/2024 / Jaswal 02/09/2024 / jaswal ItemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Date / Received Date / Opened By 57016 / S, 1000 PPM, 125 122923 12/29/2026 05/20/2024 / Jaswal 02/09/2024 / jaswal ttemCode / ItemName Lot # Expiration Date Date Opened / Opened By Received Date / Received Dat |



CHEMICAL RECEIPT LOG BOOK

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL | T2-MEB714417 | 01/27/2027 | 04/19/2024 / jaswal | 02/22/2024 / jaswal | M5875 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| 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 # |
| Inorganic Ventures | CGTI1-1 / TITANIUM 125mL 1000ug/mL | T2-TI719972 | 06/17/2027 | 06/18/2024 / Jaswal | 02/22/2024 / Jaswal | M5942 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Inorganic Ventures | CGY10-1 / YTTRIUM 125mL 10,000ug/mL | V2-Y740548 | 02/20/2029 | 07/01/2024 / Jaswal | 06/14/2024 / Jaswal | M5959 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / 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 # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57003 / Li, 1000 PPM, 125 ml | 061224 | 06/21/2027 | 07/01/2024 / Jaswal | 07/01/2024 / Jaswal | M5970 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------|---------------------------------|-------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | CGIN10-5 / INDIUM 1 x 500 ml | U2-IN729349 | 02/21/2028 | 10/08/2024 / Jaswal | 06/14/2024 / Jaswal | M5985 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------|--|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL | T2-MEB727800 | 12/21/2027 | 02/03/2025 / JANVI | 02/22/2024 / kareem | M5997 |
| | | | | | | |

| Lot # | Date | Opened By | Received Date / Received By | Chemtech Lot # |
|-----------|------------|-----------------------|-----------------------------------|--|
| MEB723367 | 08/30/2026 | 04/15/2025 / JANVI | 05/14/2024 / Jaswal | M6005 |
| \ | /IEB723367 | | /EB723367 08/30/2026 04/15/2025 / | /EB723367 08/30/2026 04/15/2025 / 05/14/2024 / |

| ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--|--|---|---|---|---|
| WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml | U2-MEB731108 | 10/30/2025 | 04/30/2025 / mohan | 05/14/2024 / Jaswal | M6016 |
| ļ | WW-LFS-2 / Laboratory Fortified Stock Solution 2, | WW-LFS-2 / Laboratory U2-MEB731108 Fortified Stock Solution 2, | ItemCode / ItemName Lot # Date WW-LFS-2 / Laboratory U2-MEB731108 10/30/2025 Fortified Stock Solution 2, 10/30/2025 | ItemCode / ItemName Lot # Date Opened By WW-LFS-2 / Laboratory U2-MEB731108 10/30/2025 04/30/2025 / mohan | ItemCode / ItemNameLot #DateOpened ByReceived ByWW-LFS-2 / Laboratory Fortified Stock Solution 2,U2-MEB73110810/30/202504/30/2025 / mohan05/14/2024 / Jaswal |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57023 / V, 1000 PPM, 125 ml | 062424 | 06/24/2027 | 09/28/2024 / jaswal | 08/05/2024 / Jaswal | M6021 |
| | | | | | | |



| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---------------------------------|---------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute Standards, Inc. | 57081 / TI, 1000 PPM, 125 ml | 0624724 | 06/27/2027 | 08/05/2024 / kareem | 08/05/2024 / Jaswal | M6023 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57048 / Cd, 1000 PPM, 125 ml | 070124 | 07/01/2027 | 08/05/2024 / kareem | 08/05/2024 / Jaswal | M6028 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57047 / Ag, 1000 PPM, 125 ml | 122823 | 12/28/2026 | 08/05/2024 / kareem | 08/05/2024 / Jaswal | M6030 |

| 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 | 010924 | 01/09/2027 | 01/14/2025 / Jaswal | 08/05/2024 / Jaswal | M6032 |
| | | | | | | |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------|--|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti | V2-MEB746173 | 01/29/2026 | 01/29/2025 / JANVI | 08/22/2024 / Jaswal | M6058 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------|-----------------------------|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | Z9651Q / CHEM-CLP-4/.25L | V2-MEB746762 | 01/01/2026 | 01/01/2025 / kareem | 09/19/2024 / kareem | M6076 |
| | | | | | | |



| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|--------------------------------|--|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic Ventures | Z9651Q / CHEM-CLP-4/.25L | V2-MEB746762 | 09/06/2029 | 01/23/2025 / kareem | 09/19/2024 / kareem | M6077 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| PCI Scientific Supply, Inc. | 1403 / Hydrogen Peroxide, 30% 1 gal | 820803 | 05/25/2025 | 11/26/2024 / Eman | 11/22/2024 / Eman | M6125 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Seidler Chemical | BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L) | 24D1062002 | 06/03/2025 | 12/03/2024 / Janvi | 11/12/2024 / Janvi | M6126 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 58112 / Mg, 10000 PPM, 500 ml | 112124 | 11/21/2027 | 01/13/2025 / kareem | 01/13/2025 / kareem | M6127 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 58025 / Mn, 1000 PPM, 500 ml | 101124 | 10/11/2027 | 01/13/2025 / kareem | 01/13/2025 / kareem | M6128 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Inorganic Ventures | CGSI1-1 / SILICON 125mL 1000ug/mL | V2-SI744713 | 07/10/2029 | 01/14/2025 / Jaswal | 10/03/2024 / Jaswal | M6137 |



| 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 | 121824 | 12/18/2027 | 04/17/2025 / Janvi | 01/13/2025 / Jaswal | M6138 |
| 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 | 103024 | 10/30/2027 | 05/06/2025 / JANVI | 01/13/2025 / Jaswal | M6142 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 58111 / Na, 10000 PPM, 500 ml | 072424 | 07/24/2027 | 01/23/2025 / kareem | 01/13/2025 / Jaswal | M6144 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 58030 / Zinc, Zn, 500 ml, 1000 PPM | 121724 | 12/17/2027 | 02/04/2025 / jaswal | 01/13/2025 / Jaswal | M6145 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| Absolute Standards, Inc. | 57051 / Sb, 1000 PPM, 125 ml | 071724 | 07/17/2027 | 01/31/2025 / kareem | 10/18/2024 / kareem | M6146 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| EPA | ICV-1 / ICV (ICP/ICPMS) STOCK SOLN | ICV1-1014 | 07/07/2025 | 02/07/2025 / JANVI | 04/20/2021 / JANVI | M6150 |



| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|---|------------|--------------------|----------------------------|--------------------------------|-------------------|
| Seidler Chemical | BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L) | 22G2862015 | 08/18/2025 | 02/18/2025 / Sagar | 01/15/2025 / Sagar | M6151 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| EPA | PART A / ICSA (ICP) STOCK SOLN | ICSA-1211 | 08/24/2025 | 02/24/2025 / kareem | 04/20/2021 / kareem | M6152 |
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
| EPA | PART B / ICSAB (ICP) STOCK SOLN | ICSB-0710 | 06/20/2025 | 02/10/2025 / kareem | 02/09/2024 / kareem | M6155 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|--|------------|--------------------|----------------------------|--------------------------------|-------------------|
| Seidler Chemical | BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L) | 24D1062002 | 03/25/2029 | 03/10/2025 / Eman | 02/02/2025 / Sagar | M6158 |
| | | | | | | |

| 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 | 011325 | 03/18/2026 | 03/18/2025 / kareem | 02/09/2025 / kareem | M6159 |
| | | | | | | |

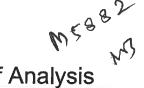
| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|----------|-------------------------------|------------|--------------------|----------------------------|--------------------------------|-------------------|
| EPA | ICV-5 / ICV (HG)STOCK SOLN | ICV 5 0415 | 07/31/2025 | 05/01/2025 / mohan | 03/30/2024 / mohan | M6161 |



284 Sheffield Street, Mountainside, New Jersey 07092, Phone : 908 789 8900, Fax : 908 789 8922

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

Certificate of Analysis Thermo Fisher SCIENTIFIC



Page 1 of 1

Certificate of Analysis 1 Reagent Lane Fair Lawn, NJ 07410 Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System 201,796,7100 tel 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, DIH | YDRATE CERTIFIED ACS (Suitable for Me | ercury Determination) | | | | |
| Country of Origin | United States | Suggested Retest Date Aug/2028 | | | | | |
| Chemical Origin | Inorganic-non animal | | | | | | |
| BSE/TSE Comment | No animal products are used a processing aids, or any other | as starting raw material ingredients, or used material that might migrate to the finished p | in processing, including lubricants, roduct. | | | | |

| N/A | | | | | | | | | |
|-------------------|-----------|----------------------------|---------------------|--|--|--|--|--|--|
| 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%) | | | | | | |

ut Sabyr

Harout Sahagian - Quality Control Supervisor - Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as an extension of this catalog number listed above. If there are any questions with this certificate, please call at (800) 227-6701.

*Based on suggested storage condition.

| m/z-> | N. 5 11 0 | m/≥-≫ 5.0⊑6 | m/z-> 2.0回5 1.0回5 | 2.0 同の の | 1. Barium nitrate (Ba) | Compound | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa | CERTIFIED WEIGHT REPORT: Part A Lot A Desc | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|--------|--------------------|----------------|-------------------------|---------------------------------------|------------------------|---|--|---|--|
| N | | 110 | 10 | [1] Spectrum No.1 | IN02 | RM# | Expiration Date:010927Recommended Storage:Ambient (Il Concentration (µg/mL):1000NIST Test Number:6UTBWeight shown below was diluted to (mL): | <u>PORT:</u> Part Number: Lot Number: Description: | om om |
| ນ ວ | | 120 | N O | | IN023 BAD022019A1 1 | Lot Number | 20 | <u>57056</u> 010924 Barium (Ba) | |
|). | | 130 | Q O | 12.514 sec]:58156.D# [Count] [Linear] | 1000 99.999 | Nominal Purity Unc Conc. (µg/mL) (%) Pu | 5E-05 00.02 | | R1815 |
| 240 | | 140 | 4 0 | 56. D# [Cour | 0.10 52.3 3 | Uncertainty Assay Purity (%) (%) W | 2% Balance Uncertainty Flask Uncertainty | | ertified Refere १२-५ |
| | | 150 160 | 0 0 0 | t] [Linear] | 3.82417 3.82441 | Target Actual Weight (g) Weight (g) | 40.0 Nitric Acid (mL) | 46 | Certified Reference Material CRM 1/2-4 |
| 1 | | 0 170 | 70 | | 1 1000.1 | Actual Conc. (µg/mL) | | | :RM М6032 |
| | | 180 | 8- 0 | | 2.0 10022-31-8 | Expanded Uncertainty (So +/- (µg/mL) CAS# | Formulated By: | Hiovanni | - |
| | | 190 Variante | 9 O | | 0.5 mg/m3 | SDS Information (Solvent Safety Info. On Attached pg.) COSHA PEL (TWA) LD51 | Giovanni Esposito | | AI Al |
| | | 200 | 100 | | orl-rat 355 mg/kg | n Attached pg.)) LD50 | 010924 | (P) | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |
| | | | | | g 3104a | NIST | <u>2</u> [2] | <u> </u> | Accredited Ite Number Idards.com |

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Certified Reference Material CRM



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

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

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|----------------------|--|--------|--------------|--------------|----------------|-------|-------|-------|----------------------------------|---------|----------|
| i di | <u.u2< td=""><td>40.02</td><td>10.02</td><td>2</td><td>-</td><td>40.2</td><td><0.02</td><td>20.02</td><td></td><td></td><td></td></u.u2<> | 40.02 | 10.02 | 2 | - | 40.2 | <0.02 | 20.02 | | | |
| | ŝ | ی د | 2 | , s | ? ! | ç | ß | ß | | | |
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| | Pb | La | Fe | I | • # | , s | Но | Hf | | | |
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| get ana | ĸ | ₽ | P | Pd | ç | | Ş | Ni | and the second | | |
| yte | 40.2 | <0.02 | <0.02 | <0.02 | <0.02 | | 3 | <0.02 | 日本の | by iCF- | |
| | Sc | Sm | Ru | Rb | Kh | ! ₹ | D. | P | 11 11 | NO CIM | |
| | <0.02 | <0.02 | 40.02 | <0.02 | <0.02 | 10.01 | 3 | <0.02 | No. of the local division of the | haver) | |
| | Ta | ŝ | ទ | Na | Ag | 2 | 2 | Se | | | |
| | <0.02 | <0.02 | <0.02 | ~0 .2 | <0.02 | 20.02 | 3 | <0.2 | CONTRACTOR OF THE OWNER. | | |
| | 티 | Sn | H B | 7 | H | Ic | 3 | Ţ | No INTERNO | | |
| | <0.02 | 40.02 | 40.02 | 40.02 | 40.02 | <0.02 | 10.01 | c0 03 | | | |
| | 2 | , K | < | \$ | < | c | 1 : | W | | | |
| | <0.02 | A 103 | 48 | <0.02 | <0.02 | 20.02 | 20.02 | 2003 | North North State | | |

Physical Characterization:

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

in P. S.

Certified by:

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

* All standard containers are meticulously cleaned prior to use.

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

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

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

Part # 57056 Lot # 010924

| m/z-> | 1.067 | m/z-> 2.0€7 | 5.014 | m/z-> 1.0E5 | 2.5E4 | 5. 0 114 | 1. Cadmium nitrate tetrahydrate (Cd) | Compound | Weight shov | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): | | CERTIFIED WEIGHT REPORT: | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|-------|-------|----------------|-------|----------------|-------|---------------------------------------|--------------------------------------|--|--|--|---|--------------------------|--|
| | | | | 0 0 | | [1] Spectrum No.1 | | RM# | Weight shown below was dliuted to (mL): | Expiration Date: nended Storage: ntration (µg/mL): | Part Number: Lot Number: Description: | PORT: | 15, Inc. om |
| | | 120 | | 20 | | - | IN024 CDM092021A1 | Lot Number | 6UTB uted to (mL): | 070127 Ambient (20 °C) 1000 | <u>57048</u> <u>070124</u> Cadmium (Cd) | | |
| | | 130 | | 30 | | 12.514 800 | 1000 99. | Nominal Pu Conc. (µg/mL) (1 | 2000.07 0.1 | | (Cd) | | R |
| 200 | | 140 | | \$ | | 12.514 sec]:58148.D# [Count] [Linear] | 99.999 0.10 36.5 | Purity Uncertainty Assay (%) Purity (%) (%) | 5E-05 Balance Uncertainty 0.100 Flask Uncertainty | | Solvent: 2% | | Certified R |
| | | 1 () () | | ő | | Count] [Line | .5 5.4797 | say Target 6) Weight (g) | ţ | | ent: 24002546 2% 40.0 | Lot # | Certified Reference Material CRM 3 15 12 4 |
| | | 160 | | 0 O | | ar] | 5.4804 | Actual Actual Weight (g) Conc. (µg/mL) | | | Nitric Acid | | terial CRM |
| | | 170 | | 70 | | | 1000.1 | 11 | Re | 5 | 5 | | M6028 |
| | | -1 2 C | | BO | | | 10022-68-1 | Expanded Uncertainty (Solvent +/- (µg/mL) CAS# 0 | Reviewed By: Ped | \$ | Alloch & B | | - |
| | | 190 200 | | 90 100 | | | | SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD51 | Pedro L. Rentas | ento | Brack | | ANAB IS AR-153 https://Ab |
| | | | | - | | | orl-rat 60.2mg/kg 3108 | ned pg.) NIST LD50 SRM | 070124 | | 070194 | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

1 of 2

Part # 57048

Lot # 070124

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

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

| | F | ₽ | B | DC | | Ŗ | AS | | Sb | A | | - | |
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| | 20.02 | 20.02 | 55 | <0.2 | 20.02 | 3 | A).02 | 20.02 | 3 | 40.02 | And a subscription | Ŀ | N OUK |
| | Nd | UTAT | Ş | Hg | MIN | | Mg | Ę | | E | C. NTALITY | | Aptalo |
| (T) = Target analyte | <0.02 | 20.02 | 3 | 40 i2 | <0.02 | 2 | 40 .01 | 70.05 | 5 | <0.02 | ALC: NO ALC: NO | | Varifics |
| yet anal | × | 2 | 2 | ٣ | Pd | ! | õ | NO | , | Ŋ | The state | | tion |
| vte | 40 2 | 20.02 | 5 | <0.02 | <0.02 | | <0.02 | <0.02 | | <0.02 | 一般的なもの | | |
| | sc | ND ND | 2 | Ru | Rb | | Rh | Ke | 1 | Ŗ | | | NC L |
| | 40.02 | 20.02 | | <0.02 | <0.02 | | A0 03 | <0.02 | | 40.02 | | agrint) | |
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Physical Characterization:

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

In P. S.

Certified by:

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

- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

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

e24



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

3.0

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Multi Analyte Custom Grade So | lution |
|---------------------|---|-----------------------|
| Catalog Number: | CLPP-CAL-1 | |
| Lot Number: | T2-MEB714417 | |
| Matrix: | 5% (v/v) HNO3 | |
| Value / Analyte(s): | 5 000 μg/mL ea: Calcium, Magnesium, | Potassium, Sodium, |
| | 2 000 μg/mL ea: Aluminum, | Barium, |
| | 1 000 μg/mL ea: Iron, | |
| | 500 μg/mL ea: Nickel, Zinc, Manganese, | Vanadium, Cobalt, |
| | 250 μg/mL ea: Silver, | Copper, |
| | 200 μg/mL ea: Chromium, | |
| | 50 μg/mL ea: Beryllium | |
| CERTIFIED VALUE | S AND UNCERTAINTIES | |

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

Density:

1.118 g/mL (measured at 20 ± 4 °C)

Assay Information:

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

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

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

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

4.0

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 27, 2022

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

11.2 Lot Expiration Date

- January 27, 2027

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

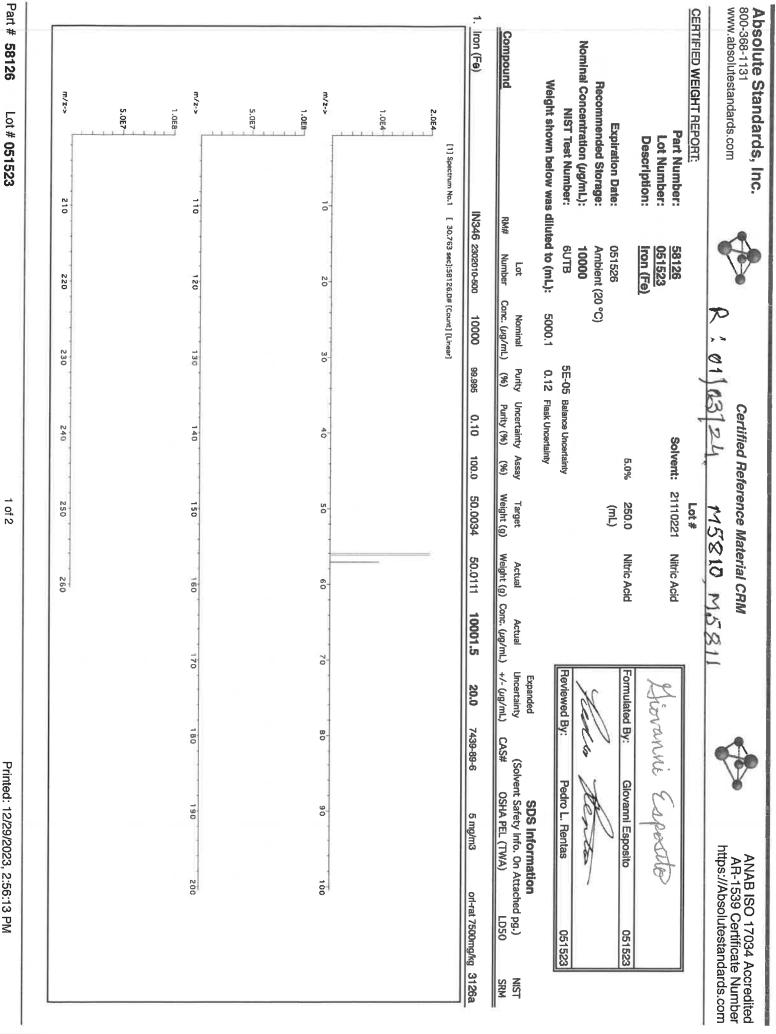
Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

SD978Ci Paul R Saines



1 of 2

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| 11. 2015 BT 70000 an | 4002 C: 4002 Fe 4 | | Trace Metals Verification by ICP-MS (µg/mL) | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | Description Descring <thdescring< th=""> Descring <thd< th=""><th></th></thd<></thdescring<> | |
|----------------------|---|----------------------|---|--|--|--|
| | (T) = Target analyte | (T) = Target analyte | (T) = Target analyte | Is Verification by ICP-MS (µg/mL) 4002 Ni 40.0 Pi Mi Mi Mi Mi | etrometry (ICP-MS): Is Verification by ICP-MS (μ g/mL) $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | trified Reference Material CRMCtrometry (ICP-MS):Is Verification by ICP-MS (µg/mL) 4002 Ni 402 Ni 402 4002 Ni 402 Re 402 32 4002 Re 402 32 32 402 402 Re 402 32 32 402 402 Re 402 32 32 402 402 Re 402 32 32 402 1 402 32 32 33 402 1 402 32 32 32 32 1 402 32 32 33 402 1 <t< th=""></t<> |

2 of 2

Certificate of Analysis

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

INORGANIC" V E N T U R E S

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

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

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

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

Density:

1.034 g/mL (measured at 20 \pm 4 °C)

Assay Information:

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

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

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

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

6.0 INTENDED USE

4.0

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

8.0 **HAZARDOUS INFORMATION**

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

9.0 HOMOGENEITY

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

10.0 **QUALITY STANDARD DOCUMENTATION**

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 30, 2022

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

11.2 Lot Expiration Date

- August 30, 2026

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

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

11.3 Period of Validity

Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

SD9781.

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Page 6 of 6

Certificate of Analysis

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

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

1.0 ACCREDITATION / REGISTRATION

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VENTURES

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



2.0 PRODUCT DESCRIPTION

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

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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

Density:

1.025 g/mL (measured at 20 ± 4 °C)

Assay Information:

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

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

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

k = coverage factor = 2

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

uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

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

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

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

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

March 17, 2023

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

11.2 Lot Expiration Date

- March 17, 2028

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

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

- Sealed TCT Bag Open Date:

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

3D978

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Hydroxylamine Hydrochloride, Crystal BAKER ANALYZED® A.C.S. Reagent Suitable for Mercury Determination (hydroxylammonium chloride)

M4251





Material No.: 2196-01 Batch No.: 0000215387 Manufactured Date: 2018/06/27 Retest Date: 2025/06/25 Revision No: 1

| Test | Specification | Result |
|---|---------------|---------|
| Assay (NH₂OH · HCl) (by KMnO₄ titrn) | >= 96.0 % | 99.1 |
| Clarity of Alcohol Solution | Passes Test | PT |
| Residue after Ignition | <= 0.050 % | 0.017 |
| Titrable Free Acid (meq/g) | <= 0.25 | 0.19 |
| Ammonium (NH4) | Passes Test | PT |
| Sulfur Compounds (as SO4) | <= 0.005 % | < 0.003 |
| Trace Impurities – ACS – Heavy Metals (as Pb) | <= 5 ppm | 4 |
| Trace Impurities – Iron (Fe) | <= 5 ppm | < 3 |
| Trace Impurities – Mercury (Hg) | <= 0.050 ppm | < 0.005 |
| | | |

Certificate of Analysis Meets ACS Reagent Chemical Requirements,

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

James Techie Jamie Ethier

Vice President Global Quality

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700 Avantor Performance Materials, LLC 100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700





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

Certificate of Conformance

| Part Number/ Revision: | D1069103 0 | 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 |
| Post Processing Run Number: (Refer to the 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.

| | 31 | | | |
|-------------------|------------------|---|----------|--|
| Quality Approval: | Jorathan Kondlan | Date: | 05/13/20 | |
| | | and the second secon | | |

Certificate of Analysis **ThermoFisher** S C I E N T I F I C

M4913-16

Page 1 of 1

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. | · · · · · · · · · · · · · · · · · · · | |
| 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 Buston

Julian Burton - Quality Control Manager - Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as an extension of this catalog number listed above. If there are any questions with this certificate, please call at (800) 227-6701. *Based on suggested storage condition.



Certificate of Analysis

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

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

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

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

Assay Information:

3.0

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

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

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

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

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

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

6.0 INTENDED USE

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 22, 2021

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

11.2 Lot Expiration Date

- September 22, 2026

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS Certificate Prepared By:

Uyen Truong Supervisor, Product Documentation

Ulya new

Certificate Approved By:

Michael Booth Director, Quality Control

Michael 2 Booth

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Paul R Laine

| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | By: Lawrence Barr By: Lawrence Barr Jy: Pedro L. Renta SDS Info. (Solvent Safety Info. | 7790-69-4 | | Printed: 1/18/2023, 4:01:43 PM |
|--|--|------------------------------|--|--------------------------------|
| A | Formulated Formulated Reviewed E Actual Uncertainty | -H - H | ۶ <u>۲</u> | |
| aterial CRM | Nitric Acid Nitric Acid Actual Actual | | ar] 160 280 | |
| leference M | 20510011 20.0 (mL) (mL) Target | 100.0134 | 0 0 0 0 220 0 220 0 220 0 220 0 220 | 1 of 2 |
| Certified Reference Material CRW | Solvent: Solvent: Solvent: 2% 5E-05 Balance Uncertainty 0.058 Rask Uncertainty Purity Uncertainty Assay (%) Purity (%) (%) | 10.0 | 8103:D#[C 240 240 240 240 | |
| | C) C) 5E-05 B 1000.12 0.058 F Nominal Purity t no. (ug/mL) (%) | 88.999 | 9.619 sec]:58103: 30 130 14 230 24 14 | |
| | | | | |
| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Lot Number: Description: Expiration Date: Thilum (070622 Recommended Storage: Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): Neight shown below was diluted to (mL): Compound RM# Number | 1. Lithium nitrate (Li) IN01 | [1] Spectrum No.1 1.0E6 5.0E5 m/z-> 10 500 500 500 10 10 10 10 10 10 10 10 10 | |

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



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

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

| | | | | | | | | | | | and the second s | and the second se | and | | The state of the s | | | | |
|----|-------|----|-------|----|-------|------|-------|---------|-------|----|--|---|---|-----|--|--------|-------|-----|-------|
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| Sb | <0.02 | లి | ⊲0.2 | Ъ | <0.02 | Ho | <0.02 | La L | ≤0.0> | ź | ≤0:0> | Re | <0.0> | 3 | €0.02 | e H | <0.02 | Þ | 4002 |
| S | ₫2 | ථ | <0.02 | 围 | <0.02 | H | 0.02 | Mg | 10.0> | ő | <0.02 | Rh | <0.02 | Ag | <0.02 | F | <0.02 | > | |
| | <0.02 | ర | <0.02 | 3 | <0.02 | h | 40.02 | Wa | <0.02 | Pd | <0.02 | Rb. | 40.02 | Z | 202 | Ē | CU CU | 5 | |
| ė | ≤0.01 | ර | <0.02 | පී | <0.02 | £ | <02 | He | <02 | ۵ | <0,00 | Ru | 89 | 3 | 200 | Ę | 200 | 2 > | 70.00 |
| | <0.02 | ථ | <0.02 | ප | <0.02 | el | A002 | Ň | 20.02 | Å | 200 | , e | 200 | 5 0 | 100 | 1 5 | | - I | 70105 |
| 6 | <0.02 | õ | <0.02 | Au | <0.02 | i de | 0.02 | PN | <0.02 | × | <02 | 3 | | ρĘ | | i F | | 5 4 | |

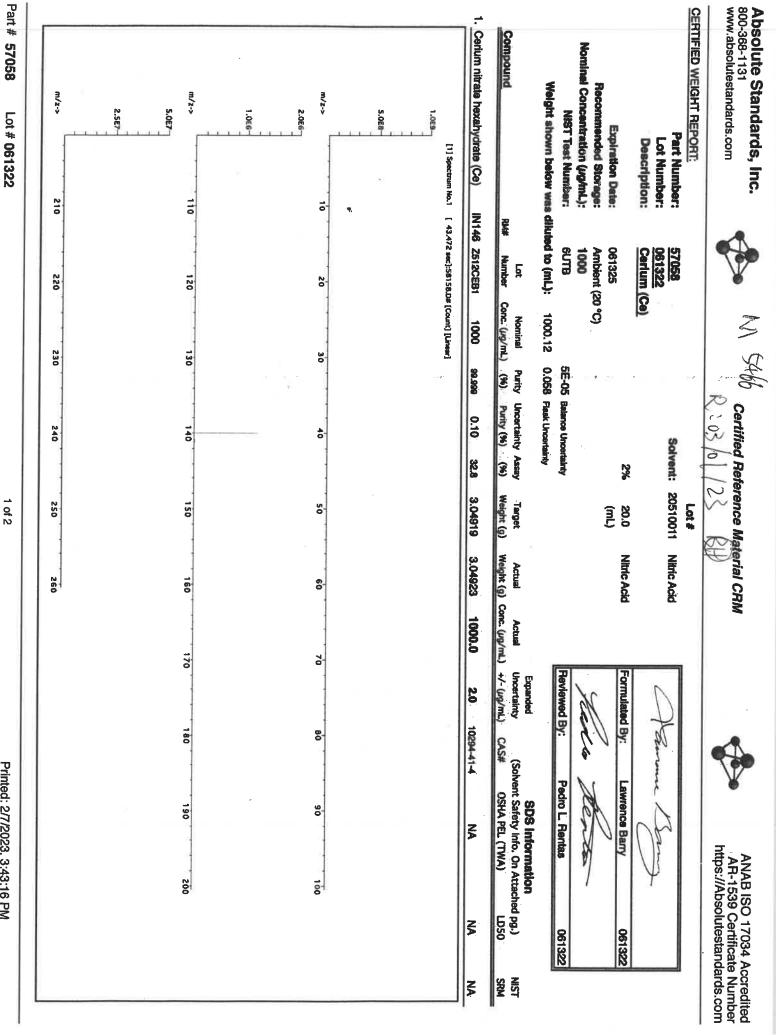
Physical Characterization:

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

Certified by:

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

Lot # 070622 Part # 57103

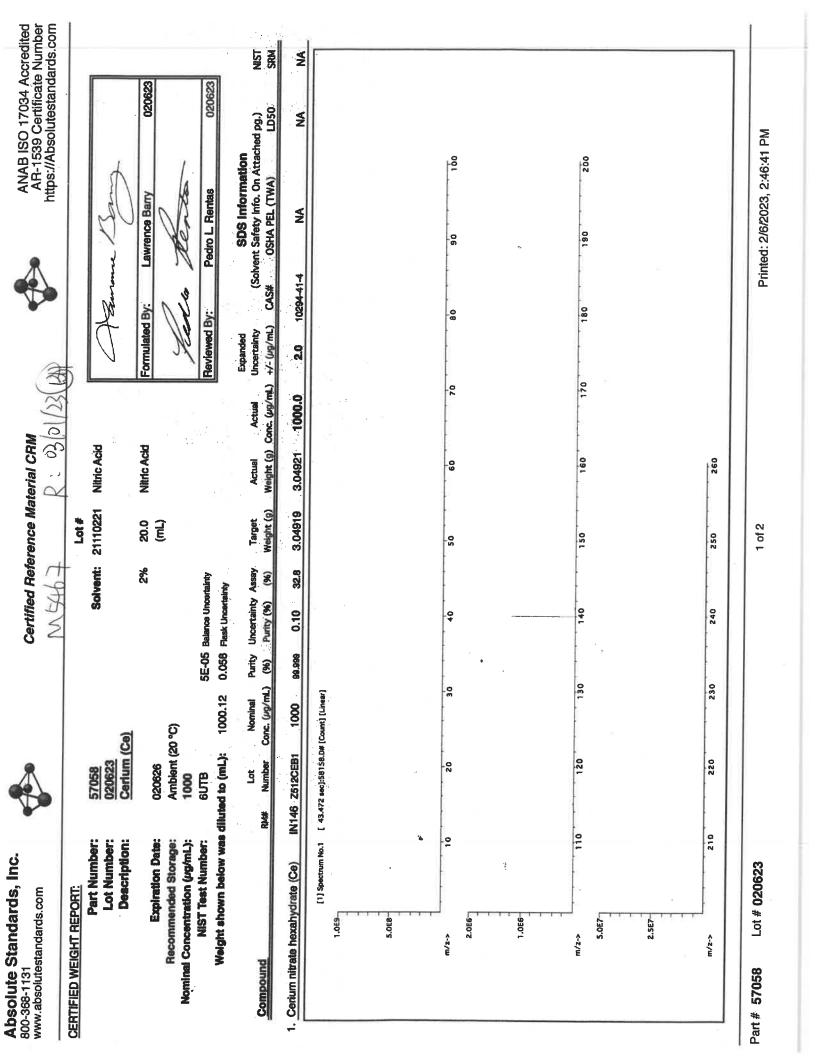


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| Insertnerskip Crupied Plasma Mass Spectroscopy (ICP-MS): Trace Metals Verification by CP-MS (ng/m1) n n n n <th>www.absolutestandards.com</th> | www.absolutestandards.com |
|---|---------------------------|
|---|---------------------------|

2 of 2

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



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

| | 42 Hr 488 W | | <0.02 Te <0.02 U | Ag <0.02 T1 <0.02 V <0.02 | <02 Th <0.02 Yb | <0.02 Tm <0.02 Y | <0.02 Sn <0.02 Zn | <0.02 Ti <0.02 Zr |
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| IS (µg/mL) | 002 | 70.05 | 20.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| igu, | đ | 1 | ž | Rh | Rb | Ru | Sm | ŝ |
| V ILP-MS | 00 | | 20.05 | <0.02 | <0.02 | <0.02 | <0.02 | <02 |
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| | 000 | 20.0 | 20:02 | 4 0.2 | <0.02 | €0.01 | <0.02 | <0.02 |
| | AI | | 2 | As | Ba | Be | 盗 | P |

(T)= Target analyte

Physical Characterization:

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

Certified by:

Ser P

* 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).



MATERIAL CERTIFICATE OF COMPLIANCE

DATE: JUNE 12, 2023

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

SPECIFICATION (S): Made from Virgin PTFE Resin

LOT NO.

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

W126678

Valu

Laura Valencia Quality Assurance Inspector

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

| m/z-> | N .5 E 5 | m/≥-> 5.0E5 | ស .0 ពា ស | m/z-≫ 1.0≣6 | 5000 | 1.004 | 1. Chromium(III) nitrate nonahydrate (Cr) | Compound | outs ewing A | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): | Par De | CERTIFIED WEIGHT REPORT: | www.absolutestandards.com |
|--------|-------------------|----------------|--------------------|----------------|------|---------------------------------------|---|---|--|--|---|--------------------------|---|
| N O | | 110 | | 10: | | [1] Spectrum No.1 | | Pa | Volume shown below was diluted to (mL): | Expiration Date: nended Storage: ntration (µg/mL): | Part Number: Lot Number: Description: | | 5 |
| 220 | | 120 | | N. O | | - | 58124 071122 | Part Lot Number Number | filuted to (mL): | 060526 Ambient (20 °C) 1000 | <u>58024</u> 060523 Chromium (Cr) | | |
| 230 | | 130 | | ů, | | 31,393 80 | 0.1000 | Dilution Factor | 2000.02 | | 1 (Cr) | | MS |
| 240 | | 140 | | | | c]:57024. | 200.0 0.084 | Initial Uncertainty Vol. (mL) Pipette (mL) | 0.058 Flask U | | | | M.S.65.8 |
| | | | | ð. | | 31,393 sec]:57024.D# [Count] [Línear] | 084 1000 | Uncertainty Nominal Pipette (mL) Conc. (µg/mL) | Balance Uncertainty Flask Uncertainty | | 21110221 2.0% | Lot # |) U |
| 250 | | н О | | С О | | t] [Linear] | 0 10000,1 | nał Initial g/mL) Conc. (µg/mL) | | (mL) | 221 Nitric Acid % 40.0 | # Solvent: | Certified Reference Inaterial Chin |
| 200 | | 180 | | 0 | | ¢. | 0.1 1000.0 | al Final rg/mL) Conc. (µg/mL) | | Ļ | 0 Nitric Acid | ent: | 123 |
| | | 170 | | 70 | | | 0.0 2.2 | Expanded al Uncertainty g/mL) +/- (µg/mL) | Lueviewed by: | X | Acid Formulated By: | | |
| | | 18. 0 | | 8- 0- | | | 7789-02-8 |) CAS | a py: | | Heren By: | | |
| | | 190 | | 90 | | | 2-8 0.5 mg(Cr)/m3 | Solvent Safety Info. On OSHA PEL (TWA) | | len | Lawrence Barry | | |
| | | 2. 0 | | 100 | | | | Attached | | | Barry | | AH-1539 Certificate Number https://Absolutestandards.com |
| | | | | | | | ori-rat 3250 mg/kg | | 626000 | 000500 | 060523 | | AH-1539 Certificate Number ttps://Absolutestandards.com |
| | | | | | | | 3112a | SRM | | | | | rds.com |

Part # 58024 Lot # 060523

1 of 2

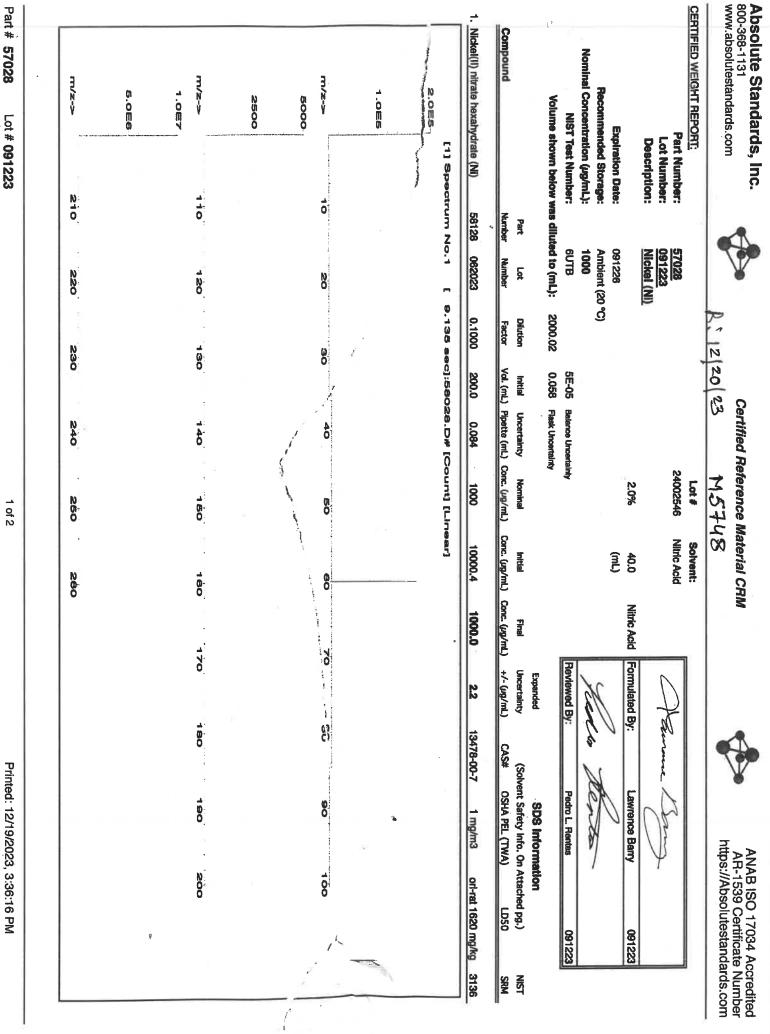
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| Absolute 800-368-1131 www.absolute | Absolute Standards, Inc. Certified Reference 800-368-1131 www.absolutestandards.com www.absolutestandards.com instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | י, Inc. | ctively | V Coupled | Plasm | na Mass S | Ce Ce | rtified Ru | eferer CP-Mi | Certified Reference Material Ci | rial C | RM | | | | | | https | AB ISO 170 1-1539 Cert ://Absolute | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |
|---|--|--|---|---|--|---|---|--|---|---|---------------------------|---|--|----------------|---|--------|---------------|------------|--|--|
| | | | | | | Trace N | Metals | Verification | | by ICP-MS | | /g/mL) | | | | | | | | |
| A | -0.02 Cd | 40.02 | Dy | 40.02 | Hf | 40.02 | - | 40.02 | Ŋ | 40.02 | | 40.02 | - Se | ð | | 7 | A 33 | W | 0.02 | |
| | | 40.02 | E Dy | <0.02 | Ho | 4).02 (0).02 | 달드 | 4 4 22 | Ş 3 | 40.02 | R P | 40.02 40.02 | Si Se | 4 A A | - | ч Ч | A 0.02 | C W | <0.02 | |
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| R Ba | | -T T | ନ୍ଦୁ ହ | A 0.02 | 1) H | 4. 6. B | F. M | A. 0.02 | P Pd | 3 8 | R RB | A 0.02 | e Na | 202 | | 1 2 | 8 8 8 | ; \$ | A0.02 | |
| | | 40.02 | ନ ଜୁ | 40.02 | 8 L : | a a 3 | Nd No | 8 8 8 8 8 | × 7 · | A A A | Sm | 40.02 | Tas | 40.02 | | | | 22- | | |
| | | | | | | | | (T)=1 | (T)= Target analyte | nalyte | | | | | | | | | | |
| Physical | Physical Characterization: | tion: | | | | | | | | | | | | | | | Certified by: | led by: | | a |
| Homogen | Homogeneity: No heterogeneity was observed in the preparation of this standard. | neity was o | bserved | l in the prepa | ration c | of this stands | ard. | | | | | | | | | | LA . | J. | | K |
| * The ce * Purifiec * All star * Standa * Standa * All star Measu | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. All standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | the conce standard rs are me rs are me ed gravim d (+/-) 0. d (+/-) 0. ce stored ce stored se stored " NIST Te | eionize ls. sticulou etrical with c chnica | on calculat ed water, c usly cleaned ly using ba the stated aps tight <i>a</i> and Kuyat, and Kuyat, | ed fro alibrat d prior lances 1 value C.E., 1 C.E., 1 C.E., 1 | ed Class <i>A</i> ed Class <i>A</i> to use. that are i that are i that approp Guidelines Governm | A glass A glass calibra therwia s for En hent Pr | ware and ware and ware and ware and with ware stated. Se stated aboratory valuating a valuating official section of the sectio | tric me the hig veights ce, Wa | easuremer yhest purit s traceable tions. pressing t ashington, | y raw to NII D.C. (| ess otherwise stated. materials are used in ST (see above). ST (see NIST 2994). | vise st are us bove). of NIST | ated. ed in | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

Part # 58024 Lot # 060523

| m/z-> | | 2.0E6 | m/z-> | 0.0 П 14 | 1.0巨5 | m/z-> | 0, 0 11 12 12 12 12 12 12 12 12 12 12 12 12 | 1.005 | 1. Lead(II) nitrate (Pb) | Compound | Weight sho | NIST 1 | Recommended Storage: Nominal Concentration (µg/mL): | Exc | | CERTIFIED WEIGHT REPORT: | ADSOIUTE Standards, Inc. 800-368-1131 www.absolutestandards.com |
|---------------------|--|-------|-------------|----------------|-------|----------|---|---------------------------------------|------------------------------|---|--------------------------------|------------------------------|--|-------------------------------|--|--------------------------|--|
| 21 0 220 0 | | | 110 120 | | | 10 20 | | [1] Spectrum No.1 [14 | IN029 PBD122016A1 | Lot M RM# Number Conc | s diluted to (mL): | NIST Test Number: 6UTB | | Expiration Date: 100926 | Lot Number: 100923 Description: Lead (Pb) | | om |
| 230 | | | 130 140 | | | 30 40 | | 14.144 sec]:58082.D# [Count] [Linear] | 1000 93.999 0.10 62.5 | Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%) V | 3000.41 0.06 Flask Uncertainty | 5E-05 Balance Uncertainty | | 2% | | | Certified Referenc R ÷ 12/20[を3 |
| 250 | | | 150 160 170 | | | 50 60 70 | | tj [Linear] | 4.80071 4.80077 1000.0 | Target Actual Actual Weight (g) Weight (g) Conc. (µg/mL) | | | (111) | 60.0 Nitric Acid | 46 NITHC ACID | | Certified Reference Material CRM ションンクロン MSチムチ |
| | | | 0 180 190 | | | 8. 0 | | | 2.0 10099-74-8 0.05 mg/m3 | Expanded SDS Informa Uncertainty (Solvent Safety Info. On +/- (µg/mL) CAS# OSHA PEL (TWA) | | Reviewed By: Pedro L. Rentas | Keller Hen | Formulated By: Lawrence Barry | Admone By | | * |
| | | | 2000 | | | 100 | | | m3 intrvns-rat 83 mg/kg 3128 | SDS Information (Solvent Safety Info. On Attached pg.) NIST # OSHA PEL (TWA) LD50 SRM | | tas 100923 | Ø | ny 100923 | \¥ | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

| | DEFF12: 10205000 | | | | | 2 of 2 | | | | | | | 00923 | Lot # 100923 | | Part # 57082 |
|---|--|---|--|------------------------------------|---|--|---|--|---|---|--|--|--|---|--|--|
| | | are used in ove). NIST | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. All standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | ity raw the to Ni the Unc. (| The certified value is the concentration calculated from gravimetric and volumetric measurements Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable t Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D | netric d the d. g and I g ffice, V | and volur assware ar vrated with wise state te laborate Printing C Printing C | s A gli re califi ropria nes foi nment | or to use. S. Gover S. Gover | ated f calibr valance t and c t, C.E. 297, U | tion calcu ed water usly clear ally using f the stat and Kuya al Note 1; al Note 1; | sentrat deioniz deioniz deioniz deioniz echnic c, B.N. h S.% o c, B.N. h i. S.% o c, B.N.h h i. S.% o c, B.N.h h h i. S.% o c, B.N.h h h i. S.% o c, B.N.h h i. S.% o c, B.N.h h h i. S.% o c, B.N.h h h h h h h h h h h h h h h h h h h | The certified value is the concentration calculated from gravimetric and volume Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with w Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating a Measurement Result," NIST Technical Note 1297, U.S. Government Printing Offi | value i ion of a prepa e certifice should keferen t Result | certified preparat landard a dards ar dards ar tandards tandards suremen suremen | * The * Purifi * Stan * Stan Mea |
| P. S. | for the second s | | | | | | | ındard. | 1 of this sta | paratio | xd in the pre | observe | Homogeneity: No heterogeneity was observed in the preparation of this standard. | o heterog | encity: N | Homog |
| Certified by: | S | | | | Vte | get anal | (T)= Target analyte | | | | | | zation: | racteri | Physical Characterization: | Physi |
| W 40.02 V 40.02 Yb 40.02 Yb 40.02 Zn 40.02 Zn 40.02 Zn 40.02 Zn 40.02 | Ть Алл 11 Алл | e 40.2 g 40.02 a 40.02 a 40.02 a 40.02 a 40.02 a 40.02 a 40.02 | 40.02 Se 40.02 Si 40.02 Ag 40.02 Ag 40.02 Na 40.02 Na 40.02 Si | Rb Sm Sm | 40.02 40.02 40.02 40.02 40.02 | P P R P | 40.02 40.02 40.02 40.02 40.02 | Hg Mg | - 40.02 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 | 요 한 않 날 막 発 표 | 40.020 | ~ Co Co Co 또 편 것 | | 5 | 40.02 40.02 40.02 40.02 40.02 | Al Sb Ba Bi Bi |
| | | | (µg/mL) | | by ICP-MS | | Verification | Metals | Trace M | | | | | | | |
| | | | | | MS): | (ICP- | trometry | s Spe | sma Mas | ed Pla | ly Couple | uctive | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | Analy | umental | Instru |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | | | | CRM | Certified Reference Material C | erenc | tified Re | Ce | | | | | s, Inc. | ards.co | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | w.absolut |



1 of 2

| Part # 57028 Lot # 091223 2of 2 | | * Purified acids, 18.2 megohm delonized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are 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). | Homogeneity: No heterogeneity was observed in the preparation of this standard. | (i) = larget analyze | $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | Spectroscopy (ICP-MS): | www.absolutestandards.com |
|---------------------------------|---|--|---|----------------------|---|-------------------------------|----------------------------|
| | | | | 6 | 17 17 17 17 17 17 17 17 17 17 17 17 17 1 | | |
| | 3 | | in P. Ster | Certified by: | W 40.02 V 40.02 Yb 40.02 Yb 40.02 Zn 40.02 Zr 40.02 | https://Absolutestandards.com | AR-1539 Certificate Number |

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Z 01 Z

| Part # | | | | | | | | | | | R | |
|--------------------------------|---------------|-------|----------------|-------|-----------------|--------------|---------------------------------------|------------------------------------|--|---|--|--|
| 58029 | m/z-v | 1.027 | m/z-> 2.0€7 | 2.567 | m/z->- 5.0巨7 | а. О П | 1.0 E | Copper(II) nitrate trihydrate (Cu) | Volume sh Compound | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: | <u>CERTIFIED WEIGHT REPORT</u> Par Lo De | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
| Lot # 071723 | ານ 100 | | 110 | | 10 | | [1] Spectrum No. | | Volume shown below was diluted to (mL): Part Lot Number Number | Expiration Date: Recommended Storage: I Concentration (µg/mL): NIST Test Number: | <u>Part Number:</u> Lot Number: Description: | Is, Inc. |
| | | | 0 | | 4 | | , J | 58129 | Part Number | - | | |
| | 220 | | 1 N | | N 0 | | - | 022723 | d to (mL): Lot Number | 071726 Ambient (20 °C) 1000 6UTB | 58029 071723 Copper (Cu) | |
| | 230 | | 130 | | ය 0 | | 13,422 8 | 0.1000 | 2000.02 Dilution Factor | ර | <u>u</u> | |
| | | | 0 | | | | əc]:58 | 200.0 | 0.058 Initial Vol. (mL) | 5E-05 | | |
| | 240 | | 1 4 0 | | ð | | 33.422 sec]:58029.D# [Count] [Linear] | 0.084 | Flask Uncertainty Uncertainty Pipette (mL) C | Balance Uncertainty | | Certified R |
| 1 of 2 | າ ທີ່ 0 | | 1 0 0 | | D. | | Count] [L | 1000 | Flask Uncertainty Uncertainty Nominal Pipette (mL) Conc. (µg/mL) | 2.0% ainty | Lot # 21110221 | Reference M |
| | NO | | 160 | | <u>e</u> | | [near] | 10000.5 | Initial Conc. (µg/mL) | 40.0 (mL) | <u> </u> | laterial |
| | 0 | | | | | | _ | 1000.0 | Final | NIFIC ACID | | CRM M5751 |
| | | | 071 | | 70 | | | 2.2 | | Pormulated By: | | |
| Prin | | | 1 80 0 | | 80 | | | 10031-43-3 | CAS | | | |
| Printed: 8/24/2023, 4:18:28 PM | | | 100 | | 0 | | | 3 1 mg/m3 | SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50 | Pedro L. Rentas | | e |
| 023, 4:1 | | | N | | <u>_</u> | | | m 3 | SDS Information Safety Info. On Attac HA PEL (TWA) | nan | | ANAI AR-1 https:// |
| 8:28 PM | | | N O O | | 100 | | | orf-rat 794 mg/kg | on :tached pg.) LDS0 | 071723 | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |
| | | | | | | | | g 3114 | NIST | 23 | | Accredited ate Number ndards.com |

| Printed: 8/24/2023, 4:18:28 PM | Printed: 8/24/20 | | | | | | 2 of 2 | | | | | | | 1723 | Lot # 071723 | 58029 | | Part # |
|--|----------------------------------|---------------------------------------|----------------------|---|---|--|--|---|--|---|--|--|--|--|---|--|--|--------|
| | | | used in)). ST | rials are see above inty of NI 4). | nless oth w materia NIST (see Incertaint | t purity ra t purity ra ceable to sing the U gton, D.C | highesi highesi ndition: Expres Washin | and the and the with weigi ated. g Office, g Office, | and ve assware vrated v wise st te labo r Evalua Printin | om gravimetric and volumetric measurements unless otherwise stated Class A glassware and the highest purity raw materials are use or to use. It are calibrated with weights traceable to NIST (see above). the, unless otherwise stated. Inder appropriate laboratory conditions. "Guidelines for Evaluating and Expressing the Uncertainty of NIST S. Government Printing Office, Washington, D.C. (1994). | l from g brated rrior to alue, u alue, u d under E., "Gu U.S. G | * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All Standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | onization culoush trically % of th 8.N. an hnical N | he concer sgohm dei standards, are meti s are meti d gravime (+/-) 0.5 (+/-) 0.5 (+/-) 0.5 Taylor, I NIST Tecl NIST Tecl | value is t 18.2 m 70 n f all m ontainen prepare certifed should b eference Result," | The certified value is the concen Purified acids, 18.2 megohm deio the preparation of all standards. All standard containers are metic Standards are prepared gravimet Standards are certifed (+/-) 0.5 Standards should be stored w Uncertainty Reference: Taylor, E Measurement Result," NIST Tech | * * * * * * * * * * * * * * * * * * * | |
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| d by: | Certified by: | | | | | | | | | is standard. | ion of th | Physical Characterization: Homogeneity: No heterogeneity was observed in the preparation of this standard. | served in | ion: eity was obs | acterizat heterogen | Physical Characterization: Homogeneity: No heterogeneity v | Phys i Homo | |
| | | | | | | yte | get anal | (T) = Target analyte | | | | | | | | | | |
| 40.02 W <0.02 40.02 U <0.02 | 다. 같 답 답 답 답 답 | 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | Ta S S Na A S S | | | 40.02 40.02 40.02 40.02 40.02 40.02 | K P P 2 S N N | 40.02 40.02 40.02 40.02 40.02 40.02 40.02 | Hg Nd | 40.02 Li 40.02 Ni 40.02 Lu 40.02 Ni 40.02 Lu 40.02 Ni 40.02 Mg 40.02 No 40.02 Mg 40.01 Os 40.02 Mg 40.02 Pi 40.02 Hg 40.02 Pi 40.02 Hg 40.02 Pi 40.02 Nd 40.02 Pi 40.02 Nd 40.02 Pi 40.02 Nd 40.02 Pi | 952F5 | 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 | A C C C F F P | 40.02 - 40. | 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 | Al Al Ba Be Bi | |
| | | | | | | 5 | · . | ry (ICP-) | tromet | Mass Spec | asma l | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | lively (| by Induct | nalysis | umental A | Instr | |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | | | | | CRM | Certified Reference Material CRM | ence | ed Refer | Certifi | | | | | Inc. | Standards, Inc. | Absolute Standards, 800-368-1131 www.absolutestandards.com | Absolute : 800-368-1131 www.absolute | |

Lot # 071723

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1 of 2

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Certified Reference Material CRM



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



| | | | | | | | Trace M | letals | Verification | Ition | by ICP-MS | | (ng/mL) | | | | | | |
|----|-------|--|--|--------|-------|----|-------------------------|-----------------|--------------------------|--|--------------|------------|--------------|----------|---------------------------|---------|--------------|----|---|
| | | and a second sec | State of the state | | | | State State State State | All and a state | Total a loss of the last | The second s | AND STREET | Nonese and | | | and a state of the second | | | | and the second second |
| R | <0.02 | 3 | <0.02 | 5 D | <0.02 | Hf | <0.02 | Ц | <0.02 | N | <0.02 | Ł | <0.02 | Se | <0.2 | 176 | <0.02 | M | <0.02 |
| Sb | <0.02 | J | 40.2 | 卤 | 40.02 | Ho | ₹0.02 | 3 | <0.02 | £ | <0.02 | Re | <0.02 | ŝ | ≤0.02 | Je T | 40.02 | þ | <0.02 |
| As | <02 | ථ | <0.02 | nE | ¢0.02 | ч | Ø.02 | Mg | 10.0> | ő | <0.02 | Rh | <0.02 | Ag | <0.02 | F | ≤0.02 | > | <0.02 |
| Ba | <0.02 | ő | <0.02 | 3 | 40.02 | Ч | Ø.02 | Ma | <0.02 | R | 40.02 | ВЪ | \$0.02 | Na Na | 40.2 | f | \$0.02 | Å | <0.02 |
| Be | F | 5 | 40.02 | ç | <0.02 | £ | <02 | Hg | <02 | ۵. | <0.02 | Ru | ≤0.02 | š | <0.02 | Tm | €0.02 | × | <0.02 |
| Bi | 40.02 | රී | <0.02 | පී | <0.02 | 4 | <0.02 | Mo | <0.02 | ۶, | 40.02 | Sm | ≤0.02 | s | <0.02 | rs. | <0.02 | Zu | <0.02 |
| æ | <0.02 | ð | <0.02 | Au | <0.02 | £ | 40.02 | PN | <0.02 | Ж | <0.2 | Sc | 40.02 | Ta | <0.02 | F | 40.02 | N | <0.02 |
| | | | | | | | | | (T) = Tarr | pet analy | yte | | | | | | | | A second s |

Physical Characterization:

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

Certified by:

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

- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
 - All standard containers are meticulously cleaned prior to use.
- Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
 - Standards are certifed ($\frac{1}{4}$) 0.5% of the stated value, unless otherwise stated.
- All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

| Part # 57050 Lot # | m/z-> | N.01 M.4 | m/2->- | 1.0E5 | 177/2-> 2.0E5 | N G M G | 8. 0 11 15 | 1. Ammonium hexatluorostannate(IV) (Sn) | Compound | Expiration Date: Recommended Storage: Nominal Concentration (ug/mL): NIST Test Number: Weight shown below w | <u>CERTIFIED WEIGHT REPORT</u> Part N Lot N Desc | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|--------------------|------------|-------------|---------|-------|------------------|------------------|---------------------------------------|---|--|---|--|--|
| Lot # 071123 | 210 | | 110 120 | | 0 No | | [1] Spectrum No.1 | (W) (Sn) INO10 SND042023A1 | Lot RM# Number | Expiration Date: 071126 Pecommended Storage: Ambient (20 °C) Concentration (µg/mL): 1000 NIST Test Number: 6UTB Weight shown below was diluted to (mL): | <u>PORT:</u> Part Number: <u>57050</u> Lot Number: <u>071123</u> Description: <u>Tin (Sn)</u> | s.com |
| | 230 | | 130 | | e e | | [15.034 sec]: | 1000 | Nominal Conc. (µg/mL) | 0 °C) 499.93 | 2 | V |
| | 20 | | 140 | | ð | | 15.034 sec]:58150.D# [Count] [Linear] | 99.999 0.10 44.2 | Purity Uncertainty Assay (%) Purity (%) (%) | 5E-05 Balance Uncertainty 0.058 Flask Uncertainty | Solvents: | Certifi |
| | N30 260 | | 150 160 | | 8 | | unt) [Linear] | 1.13107 | r Target Actual Weight (g) Weight (g) | (mL) | Lot # 21110221 22D0562008 | Certified Reference Material |
| | | | 170 | | 70 | | | 1001.6 | Actual Conc. (µg/mL) | ric acid | ric acid | CRM |
| | | | 180 | | 80 | | | 16919- | Expanded Uncertainty (Solv +/- (µg/mL) CAS# | Formulated By: | | PPGP M |
| | | | 190 200 | | 90 100 | | | 7 mg/m3 | SDS Information (Solvent Safety Info. On Attached pg.))# OSHA PEL (TWA) LD50 | Benson Chan | | R |
| | | | 0 | | ŏ | | | ω | on tached pg.) NIST LD50 SRM | 071123 - 071123 | | ANAB ISC AR-1539 (https://Abso |
| | | | | | | | | | | | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | • | Cei | Certified Reference Material CRM | ial CRM | | ANAB ISO 17034 Accredited |
|---|--|---|---|---|---------------------------|---|
| www.absolutestandards.com | 5 | | | | V | AR-1539 Certificate Number https://Absolutestandards.com |
| Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | ductively Coupled | Plasma Mass Spec | trometry (ICP-MS): | | | |
| | | Trace Metals | Is Verification by ICP-MS | P-MS (µg/mL) | | |
| AI <0.02 Cd <0.02 | Dy <0.02 | 4003 | | | | |
| | | 2 2 2 2 2 2 2 | <0.02 Ni 0.02 Nb | | Se <0.2 Tb Si <0.02 Te | 40.02 W 40.02 |
| 2 2 2 2 2 2 2 2 | | | <0.01 Os <0.02 Pd | Rb Rb | | \$ < c |
| | Ge 40.02 | Fe 40.2 Hg | 40.2 P 40.02 Pt | Ru Sm | | _ |
| | | | (T) = Target | 4 | ZITAS | <0.02 Zr <0.02 |
| Physical Characterization: | | | | | | Certified by: |
| Homogeneity: No heterogeneity was observed in the preparation of this standard. | observed in the prepa | ration of this standard. | | | | // |
| ŝ | 9 | | | | | mr P All |
| | | | | | | |
| | | 9 4 | | | 20 | |
| | | | | | ÷ | |
| * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are politoriated with using balances. | centration calculat deionized water, ca ds. eticulously cleaned | d from gravimetric librated Class A gla prior to use. | and volumetric measurer ssware and the highest p | nents unless otherwise stated. writy raw materials are used in | ie stated. 'e used in | |

Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
 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 # 57050 Lot # 071123

2 of 2

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| redited Jumber ds.com | NIST SRM | 3113 | | |
|--|---|---|---|--------------------------------------|
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | Formulated By: Lawrence Barry 091923 Formulated By: Lawrence Barry 091923 Reviewed By: Pedro L. Rentas 091923 Expanded SDS Information Uncertainty (Solvent Safety Info. On Attached pg.) N +/- (ug/mL) CAS# 0SHA PEL (TWA) LD50 S | ng/kg | 180 B0 190 200 200 200 | Printed: 2/8/2024, 5:01:14 PM |
| AM I'U (fru (| Nitric Acid | 1000.0 | | |
| Certified Reference Material CRM 02109124 | Solvent: Nttric Acid 40.0 (mL) httal bittal Conc. (ug/mL) | 10000.0 | | |
| artified Réference l 0 2 0 9 1 2 4 | Lot # 24002546 24002546 2.0% 2.0% Nominat Nominat Conc. (rg/mL) | 1000 | 34.243 eec]:58027.D# [Count] [Linear] 30 40 50 130 140 150 230 240 250 | 1 of 2 |
| Certified F | | 0.084 | 240 240 240 | |
| Å | 5E-05 02 0.058 on Initial or Vol. (mL) | 00 200.0 | 3 eec]:55 230 30 23 130 | |
| | 57027 091923 Cobait (Co) 091926 Ambient (20 °C) 1000 6UTB 6UTB 6UTB d to (mL): 2000.02 Lot Dilution Lot Dilution | 23 0.1000 | | |
| | 57027 091923 Cobalt (Cobalt (Ambient Ambient 1000 6UTB ss diluted to (mL Part Lot | 58127 050923 | | |
| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Cobait (C Cobait (C Cobait (C 091926 Recommended Storage: Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): Nominal Concentration (µg/mL): COTB NIST Test Number: COTB CODAIT (C) Part (C) CODAIT (C) C) CODAIT (C) C) C) C) C) C) C) C) C) C) | 1. Cobatt(II) nitrate hexahydrate (Co) 58 | | <pre>Part # 57027 Lot # 091923</pre> |

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

Certified Reference Material CRM



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

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

| L | 200 | 10 | 2 Contraction | 4 | 2000 | | 400 | | | - | | 4 | | | | | | | |
|---|-------|----|---------------|----|---------------|----|-------------|----|-------------------|----|--------------|----|--------------|----|--------------|----|-------|----|--------------|
| | 20.05 | 3 | 20.05 | 5 | 20.02 | Ħ | 40.02 | 3 | <0.02 | ż | 40.02 | £ | 40.02 | 8 | 40.2 | f | ₹0.02 | M | 40.02 |
| _ | 40.02 | లి | 4 02 | 山 | €0.02 | Ho | 40.02 | 5 | <0.02 | Ż | <u>40.02</u> | Re | <0.02 | 3 | ≤0.02 | Le | €0.02 | D | <0.02 |
| _ | 402 | ථ | €0.05 | 圕 | 40.02 | Ч | 40'02 | Mg | 10 ⁰ ⊳ | ő | ≤0.02 | 붭 | <0.02 | Ag | 40.02 | F | <0.02 | Ż | <0.02 |
| _ | 40.02 | లి | ≤0.02 | ઝ | 600 | ы | <0.02 | Mn | <0.02 | P | 40,02 | ßb | <0.02 | Na | 40.2 | đ | <0.02 | Ŗ | <0.02 |
| _ | 10.05 | ບັ | ≤0.02 | g | 20.0 2 | ङ | 402 | Hg | 40.2 | ۵. | €0.02 | Ru | <0.02 | ي. | ≪0.02 | Ta | ≤0.02 | Y | €0.02 |
| _ | <0.02 | ථ | £- | ö | 40.02 | Ľ | 0 02 | Mo | <u>60.02</u> | æ, | <0.02 | Sm | <0.02 | S | <0.02 | Sn | <0.02 | 2 | 6 .02 |
| _ | 40.02 | ට් | <0.02 | Au | 40.02 | £ | 40.02 | PN | 40.02 | м | 4 02 | 8 | 40.02 | £ | 40.02 | Ë | 40.02 | 72 | 2002 |

Physical Characterization:

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).

Certified by:

| Printed: 2/8/2024, 5:01:04 PM | 1 of 2 | Part # 57033 Lot # 111323 |
|---|---------------------------------------|---|
| ő | 230 240 250 26 | m/z-> 210 220 2 |
| | | 0 0 0 |
| 160 170 180 190 200 | 130 140 150 1 | m/≥-> 110 120 1 |
| | | N m 4 |
| 80 70 80 100 | 90 40 50 | 5.0E4 |
| | | - 1 .0 m B |
| | 34.433 seo]:57033.D# [Count] [Linear] | [1] Spectrum No.1 [34.433 2.0E5 |
| 1000.0 2.0 7440-38-2 0.5 mg/m3 orl-rat | 400.0 0.084 1000 | 1. Arsenic (As) 58133 020522 0.1000 |
| Expanded SDS Information Final Uncertainty (Solvent Safety Info. On Attached pg.) <u>nL) Conc. (ug/mL) +/- (ug/mL) CAS</u> # OSHA PEL (TWA) LD50 | 11 | Part Lot Dilution Compound Number Number Factor |
| Reviewed By: Pedro L. Rentas 111323 | 0.06 Flask Uncertainty | Volume shown below was diluted to (mL): 4000.0 |
| Hedre Fenter | | |
| Id Acid Formulated By: Lawrence Barry 111992 | 24002546 Nitric Acid 2.0% 80.0 | Description: <u>Arsenic (As)</u> |
| п (| Lot # Solvent: | |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | Certified Reference Material CRM | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |

< 00 **N**



Certified Reference Material CRM



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

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

(T) = Target analyte

Physical Characterization:

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

Low P. S.

Certified by:

 * 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 # 57033 Lot # 111323

| N O N O O | | |
|--|--|---|
| | 220 230 240 21 | m/z-> 210 |
| | | א. 5 מ |
| | | 5.068 |
| 150 160 170 180 190 200 | 120 130 140 10 | m/z-> 110 |
| | | N 07 00 |
| | | 5. OE6 |
| 50 70 80 100 | Ю О О | m/z-> |
| | | 1.0臣4 |
| [Linear] | 4o.1 [12.275 sec]:58105.D# [Count] [Linear] | [1] Spectrum No.1 2.0E4 |
| 11.55772 11.56201 1000.4 2.0 10043-35-3 2 mg/m3 orl-rat 2660 mg/kg | IN018 BV082016A1 1000 99.9988 0.10 17.3 11.5 | 1. Boric acid (B) IN018 E |
| Expanded SDS Information Target Actual Uncertainty (Solvent Safety Info. On Attached pg.) Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50 | Nominal Purity Uncertainty Assay Conc. (µg/mL) (%) Purity (%) (%) | Compound RM# |
| | 1000 4R | |
| Reviewed By: Pedro L. Rentas 071123 | 6UTB 5E-05 Balance Uncertainty | Nominal Concentration (µg/mL): 1 NIST Test Number: 6 |
| 40.0 Ammonium hydroxide Formulated By: Benson Chan 071123 | (B) 2.0% | |
| Solvent: MKBC8597V Ammonium hydroxide | 57005 Lo 071123 | CERTIFIED WEIGHT REPORT: Part Number: 5 |
| ce Material CRM ANAB ISO 17034 Accredited M 5종14 주가 5종14 | Certified Reference Material CRM | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |



Certified Reference Material CRM



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

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

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

(T) = Target analyte

Physical Characterization:

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

In P. Str

Certified by:

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

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

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

Part #: 57005 Lot # 071123

| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | m/z-> | 2500 | m/z-> | 500 | m/z->- | 2.5 114 | 5.OE4 | 1. Ammonium dihydrogen phosphate (P) | Compound | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa | CERTIFIED WEIGHT REPORT: Par Lo De | www.absolutestandards.com |
|--|--------|------|-------|-----|----------|------------|---------------|--------------------------------------|---|--|---|-----------------------------|
| R I D 2 M 4 C 1 M 52 15 Interview Lat* Solvent: 2111021 Nitric Acid Provide (P) 2% 40.0 Nitric Acid 2000/2 0.058 Failure inventienty Environmenty 2000/2 0.058 Failure inventienty Environmenty Environmenty Nominia Party Uncertainty Assay Target Actual Actual Commutated By: Perford L Ren 10000 ease 0.10 27.5 72.7287 72.7287 72.7284 10000.0 30.0 772.78-1 5mg/r 12.074 aeoc)15891 16. D/r County (Lineau) Factor Lange Store 5mg/r 30 40 sio eo 70 sio sio sio 30 40 sio read read read read 30 40 sio read read read read read read 30 40 sio read read read | N O | | 110 | | 10 | | [1] Spectrum | | | Expiration Date: Recommended Storage: I Concentration (µg/mL): NIST Test Number: Weight shown below was d | DRT: Part Number: Lot Number: Description: | om |
| RICZINGLA MITELS Bolvent: 21110221 Nitric Acid IDP 2% 40.0 Nitric Acid SEC5 Balance locentary (mL) Nitric Acid Formulated Br. Formulated Br. SEC5 Balance locentary (mL) Nitric Acid Formulated Br. Lawrence Balance (mL) Formulated Br. Lawrence Balance (mL) Formulated Br. Lawrence Balance (mL) Source It Mitels Acid Formulated Br. Lawrence Balance (ML) Source It Mitels Acid Formulated Br. Lawrence Balance (ML) Source It Mitels Acid Formulated Br. Formulated Br | 2220 | | 120 | | N. O | | | | Lot Number | 041726 Ambient (20 10000 6UTB 6UTB | 57115 041723 Phosphore | 5 |
| Hric Acid Iric Acid Iric Acid Iric Acid Iric Acid Actual Actual Actual Expanded Expanded Expanded SDS Inf Expanded SDS Inf Solvent Safety Inf eight (g) Conc. (ug/mL) · (AS# OSHA PEL) 2.7289 10000.0 20.0 7722-76-1 5 mg/m 2.7289 10000.0 20.0 7722-76-1 5 mg/m 150 170 180 190 190 190 | 230 | | 130 | | ຜ. ວ | | 2.074 sec]:58 | | | 00.02 | us (P) | R |
| Hric Acid Frite Acid Formulated By: Lawrence Ba Formulated By: Pedro L. Ren Expanded Actual Uncertainty (Solvent Safety Inf eight (g) Conc. (ug/mL) - 4/- (ug/mL) CAS# OSHA PEL 2.7289 10000.0 20.0 7722-76-1 5 mg/m 2.7289 10000.0 1722-76-1 5 mg/m 160 170 180 190 190 | 240 | | 140 | | 4 | | 3115.D# [Cot | | Uncertainty Assay Purity (%) (%) | 2% Balance Uncertainty Flask Uncertainty | Solvent: | 22/09/12 |
| Formulated By: Lawrence Ba Formulated By: Lawrence Ba Reviewed By: Pedro L. Ren Conc. (ug/m), -/- (ug/m), CAS# OSHA PEL 10000.0 20.0 7722-76-1 5 mg/m 10000.0 20.0 7722-76-1 5 mg/m 10000.0 eio eio | 250 | | 150 | | S O | | ınt] [Linear] | | | | | |
| Formulated By: Lawrence Ba Formulated By: Pedro L. Ren Expanded SDS Inf Uncertainty (Solvent Safety Inf +/- (ug/mL) CAS# OSHA PEL (20.0 7722-76-1 5 mg/m 20.0 7722-76-1 5 mg/m 20.0 190 90 | 260 | | | | | | | 2.7289 10000. | Actual Actual sight (g) Conc. (µg/1 | rric Acid | tric Acid | 15815 |
| 22-76-1 5 mg/m | | | | | 1 | | | 20.0 | | Formulated B | Q | |
| o 200 | | | 4 | | | | | | SC (Solvent Saf CAS# OSH/ | Ped | Gerence / | |
| .hed pg.) LbS0 LbS0 | | | | | | | | | DS Information fety Info. On Attac A PEL (TWA) | L. Rentas | Jan | https://At |
| g 3186 SRM | | | 9 | | J | | | | 0 | 041723 041723 | | tps://Absolutestandards.com |

| Abs | Absolute (800-368-1131 www.absolute | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | lards , ds.com | Inc. | - | | | | ĉ | rtified Re | eren | Certified Reference Material CRM | ial CR | M | | | | | https AF | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | 4 Accredited cate Number andards.com |
|------------|---|---|---|---|---|---|---|--|---|--|------------------------------------|---|--------------------------------|---|---------------------|------------------------|-------------|-------------------------------|---------------|--|--|
| - | nstrum | iental A | nalysi | s by Indi | uctive | ły Coupl | ed Pla | Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS); | s Spec | troscopy | (ICP | -MS): | | | | | | | | | |
| _ | | | | | | | | Trace Metals | etals | Verifica | Ition | Verification by ICP-MS | 1.00 | (µg/mL) | | | | | | | |
| - | A | 40.02 | 8 | 40,02 | Ą | 40.02 | H | 40.02 | E | A) ()2 | Z | A)22 | 7 | A).02 | Se | A 2 | ŧ | AB | W | | |
| | | A.22 | 5 2 | A0.2 | ម្មា | 40.02 | Но | 40.02 | Ŀ | 40.02 | NB | <0.02 | Re | 40.02 | ŝ | 40.02 | Te | 40.02 | c : | 40.02 | |
| | Ba | | <mark>ዮ</mark> የ | 8 8 8 8 | <u>ନ</u> ଜ | 40.02 20 | 부 부 | 40.02 20 | Mg | 40.01 002 | r S | A A 3 2 | ₽ ₽ | A A 3 S | Å. | A0.02 | 1 11 | A 600 | \$ < | 8 8 | |
| | | 10.0> | ព្ | 40,02 | ណ្ឌ | <0.02 | 놂 | <0.2 | Hg | 40.2 | שי | T | R Q | 40.02 | K 2 | 8.8 2 | | <0.02 | 4 'B | 60.02 20.02 | |
| | B | 8 8 22 22 | 5 S | 8 8 22 22 | ନ ବ | 40.02 20 | 32 | 4 4 A | N W | 4 4 8 8 | * 7 | A0.02 | s s | A A 3 S | , s | 88 | 1 S | A A A A | 2 B | 88 | |
| | | | | | | | | | | (T)= Ta | (T)= Target analyte | alyte | | | ĺ | | | | | | |
| hand | hysical | Physical Characterization: | cteriza | ution: | | | | | | | | | | | | | | Cer | Certified by: | y: | |
| - | Iomogen | eity: No I | heteroge | neity was | observ | ed in the pr | eparati | Homogeneity: No heterogeneity was observed in the preparation of this standard. | ındard. | | | | | | | | (| h | J. | Ŵ | |
| * * | The cel Purified | rtified va l acids, | alue is 18.2 m | The certified value is the concen Purified acids, 18.2 megohm dei the menaration of all standards | centrat deioniz | tion calcul red water, | lated f | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all etandarde | metric s A gla | and volu | metric nd the | measure highest p | nents Jurity r | unless oth aw mater | nerwisc ials are | e stated. 9 used in | | | | | |
| * * * * * | All star Standa Standa All Star Uncerta Measur | ndard co rds are rds are ndards s ainty Re rement | ntaine prepare certife hould I ference Result, | rs are me ad gravin d (+/-) 0 es storec e: Taylor " NIST Te | eticulo netrica).5% o d with r, B.N. echnic | ally using the stat caps tigh and Kuya al Note 1; | hed pri balanc iced val it and it, C.E. 297, L | * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. * All Standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | e calit other ropriat nes for nment | brated wit wise stat te laborat Evaluatir Printing (| h weig ed. ory co Office, |)hts trace onditions. Expressir Washingt | able to og the l on, D.(| to NIST (see above). e Uncertainty of NIST D.C. (1994). | e abov ty of N | e). IIST | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | · | | | | | | | |
| | | | | | | | | | | 8 | | | | | | | | | | | |
| Part # | 57115 | | Lot # 041723 | 1723 | | | | | | | 2 of 2 | of 2 | | | | | Print | Printed: 2/8/2024, 5:01:22 PM | 24, 5:0 |)1:22 PM | |

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| m/z-> | N. 01 00 | 5. O M 8 | m/z-> | 5.0E7 | 1.0E8 | m/z-> | N. 00 00 | 5.0E5 | Ammonium sulfate (S) | Compound | NIST Test Number: 6UTB Weight shown below was diluted to (mL): | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): | Part Number: Lot Number: Description: | 800-368-1131 www.absolutestandards.com |
|---------|----------------|-------------------|----------|-------|-------|---|--|---------------------------------------|------------------------|--|---|--|--|---|
| 210 | | | 110 | | | 10 | | [1] Spectrum No.1 | IN117 | RM# | umber: low was dilute | n Date: lorage: lg/mL): | <u>Part Number:</u> Lot Number: Description: | |
| 220 | | | 120 | | | NO | | - | IN117 SLBR7225V | Lot Number C | GUTB d to (mL): | 122926 Ambient (20 °C) 1000 | <u>57016</u> 122923 Sulfur (S) | |
| 230 | | | 130 | | 9 | 30 | | 33.603 80 | 1000 | Nominal F Conc. (µg/mL) | 4000.0 5 | ĉ | | <i>b</i> |
| N 40 | | | 140 | | | b | den gegen og gener første kommen och som en forse og | 33.603 sec]:57016.D# [Count] [Linear] | 99.9 0.10 24.3 | Purity Uncertainty Assay (%) Purity (%) (%) | 5E-05 Balance Uncertainty 0.06 Flask Uncertainty | | Solvent: | Certified Re |
| N 80 | | | 100 | | | 50 | | Count] [Lin | .3 16.4979 | say Target 6) Weight (g) | Y | | Lot # 122923 | fere 12 |
| N80 | | | 0 | | | 8 | | 9 9 7 | 16.4980 | Actual Weight (g) | | | ASTM Type 1 Water | aterial CRM |
| | | | 170 | | | 70 | | | 1000.0 | Actual (Conc. (µg/mL) | 5 | | 1 | rm 167816- |
| | | | 180 | | | 80 | | | 2.0 77 | Expanded Uncertainty +/- (µg/mL) | Reviewed By: | M | Formulated By: | |
| | | | | | | Complete and complete | | | 7783-20-2 | (Solvent : CAS# 05 | Pedr | \$ | a and a second sec | |
| | | | 190 | | | 0 | | | NA | SDS Information It Safety Info. On Attac OSHA PEL (TWA) | Pedro L. Rentas | e la | Benson Chan | http |
| | | | 2000 | | | 100 | | | ort-rat 4250mg/kg 3181 | SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50 | 122923 | 7 | 100002 | AR-1539 Certificate Number https://Absolutestandards.com |

1 of 2

| Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | * All standard containers are meticulously cleaned prior to use. * All standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All standards should be stored with caps tight and under appropriate laboratory conditions. * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the measurement of all standards | | Homogeneity: No heterogeneity was observed in the preparation of this standard. | Physical Characterization: | (T) = Target analyte | AI A002 Cd A002 Pr A002 Pr | Trace Metals Verification by ICP-MS (µg/mL) | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|--|---|--|--------|---|----------------------------|----------------------|--|---|---|--|
| 30 | | | 5 2 | I She | Certified by: | | MI MI< | | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

2 of 2

Printed: 2/8/2024, 5:01:28 PM

| | - | 260 | 250 | 240 | 230 | | 220 | 210 | m/z-> |
|---|-------------------|----------------------|----------------------|--|---------------|---------------------------|--|--|--|
| | | | | | | | | | 1.0巨5。 |
| | | | | | | | | | 2.0厘5 |
| 180 190 200 | 170 | 160 | 150 | 140 | 130 | р. 9 | 120 | 110 | m/z-> |
| | | | | | | | | | 2,5E |
| | | | | | | | | | 5.0E5 |
| 80 80 100 | 70 | eo | 50 | 40 | 8 | magan Raji Anana ya Anany | N | 10 | m/z-> |
| | | | | | | | | | 1000 |
| | | ear) | ount] [Lin | 24.004 sec];58116,D# [Count] [Linear] | ¢ sec];58 | [24.00 | | [1] Spectrum No.1 | 2000 |
| 20.0 7763-20-2 NA orf-rat 4250mg/kg 3181 | 10000.1 | 82,4682 | 82.4675 | 0.10 24.3 | 99,9 | 10000 | IN117 SLBR7225V | IN11 | 1. Ammonium sulfate (S) |
| Expanded SDS Information Uncertainty (Solvent Safety Info. On Attached pg.) NIST +/- (ug/mL) CAS# OSHA PEL (TWA) LDSO SRM | (g) Conc. (µg/mL) | Actual Weight (g) | Target Weight (g) | Uncertainty Assay Purity (%) (%) | Purity (%) | Nominal Conc. (µg/mL) | Lot. Number | RM# | Compound |
| i By: Ped | [F | | | Balance Uncertainty Flask Uncertainty | 0.058 | 1999.48 | led to (mL): | Weight shown below was diluted to (mL): | Weight show |
| Lawrence barry | 1 1 | | | | | 20 °C) | 071126 Ambient (20 °C) 10000 Sum | Expiration Date: nended Storage: htration (µg/mL): %T Test Number: | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Teet Number |
| around Bring | Type 1 Water | ASTM Ty | Lot# 071123 | Solvent: | | E) | 57116 071123 Sulfur (S) | <u>PORT:</u> Part Number: Lot Number: Description: | CERTIFIED WEIGHT REPORT: Part N Lot N Desc |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | CRM | | ference M | Certified Reference Material | R a | | | om | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
| | | | | | | | | And in case of the local division of the loc | |

| 800-368-1131 www.absolutestandards.com | | 0 | Certified Reference Material CRM | nce Material C | RM | | | • | ANAB ISO 1: AR-1539 Ce https://Absolut | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |
|---|--|---|--|---|---|-------------------------|-----------|------------|--|--|
| Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | ictively Coupled | Plasma Mass Sp | ectrometry (IC | P-MS): | | | | | | |
| | | Trace Metals | | Verification by ICP-MS | IS (µg/mL) | | | | | |
| AI <0.02 Cd <0.02 | Dv 40.02 | A M | -12 | | | a dista div. | ALL MERCY | | A STREET STREET STREET | |
| 40.02 Ca | | 40.02 | 40.02 40.02 | Ni <0.02 Nb <0.02 | Pr <0.02 Re <0.02 | Si Se | | | | A 6.3 |
| 50 C C | Gd <0.02 | In <0.02 N | Mg <0.01 C | | | | | | < 0 | <0.02 |
| 40.02 | Ga 40.02 | Fe <0.2 Hg | A A 3 12 | 8 8 | | | 12 1 | | 40.02 Y 40.02 | 40.02 20.02 |
| B (UUZ CI 40,02 | Au <0.02 | <0.02 | <0.02 | | Sc <0.02 | Ta o | <0.02 | | 40.02 21 21 40 | 40.02 |
| Physical Characterization: | | | (T)= Target analyte | alyte | | | | ۲ ۲ | Certified by: | |
| Homogeneity: No heterogeneity was observed in the preparation of this standard. | oserved in the prepa | ation of this standard | | | | | | | | 1 |
| | | | | | | | (| the second | P.S. | |
| * The certified value is the concentration calculated from gravimetric and volumetric measurements * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity in the preparation of all standards. * All standard containers are meticulously cleaned prior to use the preparation of the preparation of all standards. | ntration calculate ionized water, ca | d from gravimetri librated Class A g | c and volumetric lassware and the | c measurement highest purity | s unless otherwise stated. raw materials are used in | ise state are used i | 5.6 | | | |
| * 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. | trically using bala % of the stated | value, unless othe | brated with weighwise stated. | phts traceable : | to NIST (see ab | ove). | | | | |
| * Uncertainty Reference: Taylor, Measurement Result," NIST Tec | vith caps tight ar B.N. and Kuyat, (hnical Note 1297 | id under appropria 2.E., "Guidelines fc , U.S. Governmen | ite laboratory co r Evaluating and t Printing Office, | I Expressing the Washington, D | ⁹ Uncertainty of NIST).C. (1994). | F NIST | | | | |
| | · | | | | | | | | | |
| | | ð | | | | | | | | |
| * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D. | itrically using bail trically using bail is of the stated with caps tight ar B.N. and Kuyat, (hnical Note 1297 | prior to use. ances that are cali value, unless othe d under appropria 2.E., "Guidelines fo , U.S. Governmen | brated with weig rwise stated. re laboratory co or Evaluating and t Printing Office, t Printing Office, | ghts traceable . onditions. I Expressing the Washington, D | to NiST (see ab 3 Uncertainty o).C. (1994). | ove). F NIST | | | | |

2 of 2

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| Image: | TT/Z-> | 2500 | 5000 | m/z-> | 500 | 1000 | N.00 M.4 | 5.0E4 | 1. Ammonium dihydrogen phosphate (P) IN008 PvœzoisAi | Compound | Weight shown below was diluted to (mL): | NIST Test Number: | Recommended Storage: Nominal Concentration (ug/mL): | Expiration Date: | Lot Number: Description: | CERTIFIED WEIGHT REPORT: Part Number: | www.absolutestandards.com |
|--|--------|------|------|-------|-----|----------|-------------|-------|--|--|---|---------------------------|--|------------------|-----------------------------|--|---------------------------|
| ric Acid Fic Acid Formulated By: Formulated | | | | 120 | | 20 | | | | Lot Number | | | | | | | R |
| ric Acid Fic Acid Formulated By: Formulated | 240 | | | 140 | | 40 | | | 89.899 0.10 27.5 7.275 | Purity Uncertainty Assay (%) Purity (%) (%) | 0.058 Flask Uncertainty | 5E-05 Balance Uncertainty | | | | | 00 |
| Prieved By: Programity Procertainty Procentainty Processory P | | | | | | | | | .2730 | Actual Actual Weight (g) Conc. (µg/mL) | | | | Nitric Acid | | | M5820 |
| | | | | 180 | | | | | 7722-76-1 |) CAS | | | Here ten | Lawrence | forme (| | ٩ |

| | 01:19 PM | 024, 5:C | Printed: 2/8/2024, 5:01:19 PM | Print | | | | | | 2 of 2 | | | | | | | 123 | Lot # 091123 | Lot | 57015 | Part # |
|--|--|---------------|--|------------------|--|---------------------------------|--|-------------------------------|--|---|---|---|--|--|---|---|--|---|---|--|--|
| | | | | | | | | | | | 2 | | | 5 | | · · · | | Ð | | | |
| | | | | | e). IST | rials are e abov ity of N | ity raw materials are us le to NIST (see above). the Uncertainty of NIST , D.C. (1994). | able to g the l on, D.(| highest p ts trace; ditions. Xpressin Vashingt | id the f id. yry con y and E ffice, V | sware ar ated with ise state laborate ivaluation rinting O | A glas calibr otherw opriate is for E ment P | ed Class to use. that are , unless (der appro Guideline Governr | calibrat ad prior alances d value and un , C.E., " 97, U.S | d water, sly clean y using b y using b the state the state hps tight nd Kuyat Note 12 | eionize Is. ticulou: ticulou: 5% of 1 S% of 1 B.N. a chnical | Purmed acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. All Standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | 8.2 me of all s repared ertifed ertifed prence: esult," | acids, 1 aration s are pi s are ci ards sh nent Refe | Purmed acids, 18.2 meg the preparation of all si All standard containers Standards are prepared Standards are certifed (All Standards should be Uncertainty Reference: Measurement Result," Measurement Result, " Measurement Result," | * * * * * * |
| · | A. | 1º | in the second se | (| stated | henwise | inless of | nents | neasurer | netric n | nd volur | letric a | m gravim | ted fro | n calcula | intratio | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated | ue is th | fied val | he certi | + + 7 |
| | y: | Certified by: | Ca | | | | | | | | | wland | of this stan | paration | in the pre | observed | r nysical Unaracterization: Homogeneity: No heterogeneity was observed in the preparation of this standard | Sterrizal eterogen | y: No he | r nysical Characterization: Homogeneity: No heterogeneity | Ho |
| | | | | | | | | | alyte | (T) = Target analyte | () = () | | | | | | | | | | Į |
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| | | | | | | | (µg/mL) | 1 | Y ICP-N | tion b | Verification by ICP-MS | tals V | Trace Metals | 글 | | | | | | | |
| | | | | | | | | | MS): | (ICP-) | rometry | Spect | na Mass | d Plası | Couple | ıctively | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | nalysis | ntal Ar | strume | = |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | VAB ISO 17(R-1539 Certi s://Absolutes | http: A | | | | | 2 | ial CRM | e Mater | ferenc | Certified Reference Material | Cert | | | V | | Inc. | ards, Is.com | standard | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | Absolute 800-368-1131 www.absolute |
| | | | | | | | | | | | | | | | | | | | | | |

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





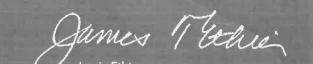


Material No.: 3624-01 Batch No.: 0000281938 Manufactured Date: 2021-06-07 Retest Date: 2026-06-07 Revision No.: 1

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 |
| Iron (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



Jamie Ethier Vice President Global Quality

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700 Avantor Performance Materials, LLC 100 Mansford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone 610.386.1700



Certificate of Analysis

R: 02/22/24 M.5942

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--------------------------------------|
| Catalog Number: | CGTI1 |
| Lot Number: | T2-TI719972 |
| Matrix: | 2% (v/v) HNO3 tr. HF |
| Value / Analyte(s): | 1 000 μg/mL ea: Titanium |
| Starting Material: | Ti Metal |
| Starting Material Lot#: | 2094 |
| Starting Material Purity: | 99.9975% |
| CERTIFIED VALUES | AND UNCERTAINTIES |

| Certified Value: | 1002 ± 5 μg/mL |
|------------------|------------------------------------|
| Density: | 1.012 g/mL (measured at 20 ± 4 °C) |

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Assay Information:

3.0

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

- 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 | Characterization of CRM/RM by One Method |
|---|---|
| Certified Value, $X_{\mbox{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results: | Certified Value, X _{CRMRM} , where one method of characterization is used is the mean of individual results: |
| $\begin{split} & \textbf{X}_{CRM/RM} = \Sigma(w_i) \; (\textbf{X}_i) \\ & \textbf{X}_i = \text{mean of Assay Method } i \; \text{with standard uncertainty } \textbf{u}_{char \; i} \\ & \textbf{w}_i = \text{the weighting factors for each method calculated using the inverse square of the variance:} \\ & \textbf{w}_i = (1/u_{char \; i})^2 / (\Sigma(1/(u_{char \; i})^2)) \end{split}$ | $X_{CRM/RM} = (X_a) (u_{char a})$ $X_a = mean of Assay Method A withu_{char a} = the standard uncertainty of characterization Method A$ |
| CRM/RM Expanded Uncertainty (±) = U _{CRM/RM} = k ($u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts}$) ^{Y₂} k = coverage factor = 2 $u_{char} = [\Sigma((w_i)^2 (u_{char}_i)^2)]^{Y_2}$ where u_{char} is the errors from each characterization method u_{bb} = bottle to bottle homogeneity standard uncertainty u_{tts} = long term stability standard uncertainty (storage) u_{tts} = transport slability standard uncertainty | CRMRM Expanded Uncertainty (±) = U _{CRMRM} = k ($u^2_{char e} + u^2_{bb} + u^2_{lts} + u^2_{ts}$) ^{1/2} k = coverage factor = 2 uchar e = the errors from characterization u _{bb} = bottle to bottle homogeneity standard uncertainty u _{lts} = long term stability standard uncertainty (storage) u _{ts} = transport stability standard uncertainty |

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.

| М | Ag | < | 0.000536 | Μ | Eu | < | 0.000268 | 0 | Na | < | 0.032670 | Μ | Se | | 0.001204 | 0 | Zn | < | 0.003267 | |
|---|----|---|----------|---|------|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|
| 0 | AI | | 0.000872 | 0 | Fe | | 0.003225 | 0 | Nb | < | 0.043560 | 0 | Si | | 0.004735 | 0 | Zr | < | 0.043560 | ŧ |
| М | As | < | 0.008586 | М | Ga | < | 0.000268 | Μ | Nd | < | 0.000268 | Μ | Sm | < | 0.000268 | | | | | |
| Μ | Au | < | 0.004577 | Μ | Gd | < | 0.000268 | 0 | Ni | < | 0.010890 | М | Sn | | 0.000096 | | | | | |
| 0 | В | < | 0.008929 | М | Ge | < | 0.002146 | M | Os | < | 0.000269 | 0 | Sr | | 0.000096 | | | | | |
| М | Ba | < | 0.002683 | Μ | Hf | | 0.002161 | 0 | P | < | 0.054450 | М | Та | | 0.010560 | | | | | |
| M | Be | < | 0.005366 | Μ | Hg | < | 0.003231 | Μ | Pb | < | 0.001073 | Μ | Тb | < | 0.000268 | | | | | |
| М | Bi | < | 0.001609 | М | Но | < | 0.000268 | М | Pd | < | 0.000268 | Μ | Те | < | 0.001341 | | | | | |
| 0 | Ca | | 0.000676 | Μ | In | < | 0.002683 | Μ | Pr | < | 0.000268 | M | Th | < | 0.053663 | | | | | |
| М | Cd | < | 0.000268 | Μ | lr – | < | 0.000269 | М | Pt | < | 0.000536 | S | Tī | < | | | | | | |
| М | Се | < | 0.000268 | Μ | κ | | 0.001172 | М | Rb | < | 0.000268 | Μ | TI | < | 0.000268 | | | | | |
| М | Co | < | 0.004293 | Μ | La | < | 0.000268 | М | Re | < | 0.000268 | Μ | Tm | < | 0.000268 | | | | | |
| М | Cr | | 0.000752 | 0 | Li | < | 0.027225 | M | Rh | < | 0.000268 | M | U | < | 0.000268 | | | | | |
| М | Cs | < | 0.000268 | М | Lu | < | 0.000268 | Μ | Ru | < | 0.000269 | M | V | < | 0.019855 | | | | | |
| 0 | Cu | < | 0.010890 | 0 | Mg | < | 0.005445 | i | S | < | | Μ | W | | 0.000473 | | | | | |
| M | Dy | < | 0.000268 | 0 | Mn | < | 0.003267 | M | Sb | < | 0.006976 | Μ | Y | < | 0.002146 | | | | | |
| Μ | Er | < | 0.000268 | Μ | Мо | | 0.000774 | 0 | Sc | < | 0.004900 | М | Yb | < | 0.000536 | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

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 - 47.87 +4 6 Ti(F)6-2 Chemical Compatibility - Soluble in concentrated HCl, HF, H3PO4 H2SO4 and HNO3. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.

Stability - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)6-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in an LDPE container.

Ti Containing Samples (Preparation and Solution) - Metal (Soluble in H2O / HF caution -powder reacts violently); Oxide - low temperature history anatase or rutile (Dissolved by heating in 1:1:1 H2O / HF / H2SO4); Oxide - high temperature history (~800EC) brookite (fuse in Pt0 with K2S2O7); Ores (fuse in Pt0 with KF + K2S2O7 - no KF if silica not present); Organic Matrices (Dry ash at 450EC in Pt0 and dissolve by heating with 1:1:1 H2O / HF / H2SO4 or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite crystalline form).

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 48 amu | 14 ppt | N/A | 32S16O, 32S14N, |
| | | | 14N16O18O, |
| | | | 14N17N2, 36Ar12C, |
| | | | 48Ca, [96X=2 |
| | | | (where X = Zr, Mo, |
| | | | Ru)] |
| ICP-OES 323.452 nm | 0.0054 / 0.00092 µg/mL | 1 | Ce, Ar, Ni |
| ICP-OES 334.941 nm | 0.0038 / 0.000028 µg/mL | 1 | Nb, Ta, Cr, U |
| ICP-OES 336.121 nm | 0.0053 / 0.000034 µg/mL | 1 | W, Mo, Co |

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 17, 2022

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

11.2 Lot Expiration Date

- June 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 Approved By:

Thomas Kozikowski Manager, Quality Control

DD978ti

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

3.0

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--------------------------------------|
| Catalog Number: | CGY10 |
| Lot Number: | V2-Y740548 |
| Matrix: | 2% (v/v) HNO3 |
| Value / Analyte(s): | 10 000 μg/mL ea: Yttrium |
| Starting Material: | Yttrium Oxide |
| Starting Material Lot#: | 2661 and 06230520YL |
| Starting Material Purity: | 99.9984% |
| CERTIFIED VALUES AI | ND UNCERTAINTIES |

| Certified Value: | 10000 ± 30 µg/mL |
|------------------|--|
| Density: | 1.032 g/mL (measured at 20 \pm 4 °C) |

Assay Information:

| Assay Method #1 | 10011 ± 25 µg/mL EDTA NIST SRM 928 Lot Number: 928 |
|-----------------|---|
| Assay Method #2 | 9997 ± 50 μg/mL ICP Assay NIST SRM 3167a Lot Number: 190730 |
| Assay Method #3 | 9984 ± 31 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2 |

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

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i = mean of Assay Method I with standard uncertainty u_{char} i w_i = the weighting factors for each method calculated using the inverse square of
 - the variance:
 - $w_i = (1/u_{char\,i})^2 \, / \, (\Sigma(1/(u_{char\,i})^2)$

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

- $u_{char} = [\Sigma((w_j)^2 (u_{char})^2)]^{\frac{1}{2}}$ where u_{char} are the errors from each characterization method
- ubb = bottle to bottle homogeneity standard uncertainty
- uits = long term stability standard uncertainty (storage)
- uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

 $\begin{array}{l} X_{CRM/RM}=(X_{\alpha}) \; (u_{char \; \alpha}) \\ X_{\alpha}= mean \; of Assay \; \mbox{Method} \; A \; \mbox{with} \\ u_{ohar \; \alpha}= \mbox{the standard uncertainty of characterization} \; \mbox{Method} \; A \end{array}$

CRM/RM Expanded Uncertainty (\pm) = U_{CRM/RM} = k ($u^2_{char a} + u^2_{bb} + u^2_{tts} + u^2_{bs}$)^{1/2} k = coverage factor = 2 $u_{char a}$ = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty

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

- 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 Callbration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

| М | Ag | < | 0.004600 | м | Eu | | 0.009037 | м | Na | | 0.086360 | M | Se | < | 0.005200 | м | Zn | | 0.030125 |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| | - | - | | | | | | | | | | | | - | | | | | |
| М | AI | | 0.014862 | 0 | Fe | | 0.002410 | M | Nb | < | 0.000570 | U | Si | | 0.024100 | 0 | Zr | < | 0.002600 |
| М | As | < | 0.003500 | М | Ga | < | 0.000570 | М | Nd | | 0.000923 | M | Sm | | 0.000461 | | | | |
| М | Au | < | 0.001700 | М | Gd | < | 0.003500 | М | Ni | < | 0.005700 | М | Sn | < | 0.002300 | | | | |
| 0 | в | | 0.002209 | М | Ge | < | 0.005200 | М | Os | < | 0.001200 | М | Sr | < | 0.004600 | | | | |
| 0 | Ва | < | 0.002500 | М | Hf | < | 0.000570 | n | Ρ | < | | М | Та | < | 0.000570 | | | | |
| 0 | Ве | < | 0.001400 | М | Hg | < | 0.000570 | М | Pb | | 0.005020 | М | Tb | | 0.001044 | | | | |
| М | Bi | < | 0.003500 | М | Но | | 0.009037 | М | Pd | < | 0.005100 | М | Те | < | 0.002300 | | | | |
| 0 | Са | | 0.009841 | М | In | < | 0.002300 | М | Pr | < | 0.002300 | М | Th | < | 0.000570 | | | | |
| М | Cd | < | 0.000570 | М | Ir | < | 0.000570 | М | Pt | < | 0.000570 | М | Ti | < | 0.003500 | | | | |
| М | Се | < | 0.002300 | 0 | к | | 0.018677 | М | Rb | < | 0.000570 | М | TI | < | 0.000570 | | | | |
| М | Co | < | 0.000570 | М | La | | 0.000461 | М | Re | < | 0.000570 | М | Tm | < | 0.003500 | | | | |
| М | Cr | < | 0.004000 | 0 | Li | < | 0.009300 | М | Rh | < | 0.008000 | М | U | < | 0.000570 | | | | |
| М | Cs | < | 0.000570 | M | Lu | | 0.000582 | М | Ru | < | 0.000570 | Μ | v | | 0.001265 | | | | |
| М | Сц | | 0.002610 | 0 | Mg | | 0.001486 | n | S | < | | М | W | < | 0.002300 | | | | |
| М | Dy | | 0.003815 | M | Мп | | 0.000582 | М | Sb | | 0.005422 | s | Y | < | | | | | |
| М | Er | | 0.003615 | М | Мо | < | 0.005700 | М | Sc | < | 0.001200 | М | Yb | | 0.001827 | | | | |
| | | | | | | | | | | | | | | | | | | | |

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

| Estimated D.L. | Order | Interferences (underlined indicates severe) |
|------------------------|--|--|
| 0.8 ppt | N/A | 73Ge16O, 178Hf+2 |
| 0.005 / 0.000036 µg/mL | 1 | Ce, Th |
| 0.004 / 0.00007 µg/mL | 1 | Ce |
| 0.005 / 0.0009 µg/mL | 1 | Ta, Th |
| | 0.8 ppt 0.005 / 0.000036 µg/mL 0.004 / 0.00007 µg/mL | 0.8 ppt N/A 0.005 / 0.000036 μg/mL 1 0.004 / 0.00007 μg/mL 1 |

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 Regulrements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 20, 2024

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

11.2 Lot Expiration Date

- February 20, 2029

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS **Certificate Prepared By:**

Uyen Truong **Custom Processing Supervisor**

Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

Mayn Mung Mayni Kh Paul R Laina

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

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

| | | | | | | | | | | | | | | | 1 |
|--|---|--|--|---|---|--|--|--|---|---|---|--|---|---|------|
| | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. All standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise st. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are us the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. All standards should be stored with caps tight and under appropriate laboratory conditions. Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | rements t purity r ceable to s. s. sing the l ngton, D.0 | highes highes tra ndition: Expres Washir | volumetric re and the i with weij stated. stated. voratory cc uating and ing Office. | ric and glasswa glasswa alibratec nerwise riate lab for Evalu nt Print | * The certified value is the concentration calculated from gravimetric and volumetric measurements unlee * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw n the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIS * Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated. * All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Unce Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1 | ed fron alibrate alibrates lances l value, l value, C.E., "Q C.E., "Q C.E., "Q | The certified value is the concentration calculated from gravi Purified acids, 18.2 megohm deionized water, calibrated Class the preparation of all standards. All standard containers are meticulously cleaned prior to use. Standards are prepared gravimetrically using balances that ar Standards are certifed (+/-) 0.5% of the stated value, unless All standards should be stored with caps tight and under app Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelin Measurement Result," NIST Technical Note 1297, U.S. Gover | ntratio sionized s. etrically etrically 5% of t 5% of t B.N. a B.N. a | he conce egohm de standardd s are met d gravim (+/-) 0. e stored : Taylor, NIST Tev | alue is t 1 8.2 me n of all : ntainer: orepare certifed bould bu ference ference Result," | The certified value is the concen Purified acids, 18.2 megohm dei the preparation of all standards. All standard containers are meti Standards are prepared gravime Standards are certifed (+/-) 0.5 All standards should be stored w Uncertainty Reference: Taylor, E Measurement Result," NIST Tech | * The c * Purifie the purifie * All stand * Stand * All stand Measu | |
| In P. Ar | | | | | | ġ. | Homogeneity: No heterogeneity was observed in the preparation of this standard. | ration of | n the prepa | bserved | eity was ol | eterogen | neity: No h | Homoge | |
| Certified by: | | | lyte | (T) = Target analyte | (T) = T | | | | | | lion: | cterizat | Physical Characterization: | Physic | |
| $ \begin{array}{c c c c c c c c c c c c c c c c c c c $ | Se T Si <0.02 | Pr 40.02 Re 40.02 Rh 40.02 Rh 40.02 Rb 40.02 Sc 40.02 Sc 40.02 | 40.02 < | PP PP K | 40.02 40.02 40.02 40.02 40.02 40.02 | Li Lu Mg Mn Hg Nd | 40.02 40.02 40.02 40.02 40.02 | HH Fr Fr Fr Fr Fr | 40.02 40.02 40.02 40.02 40.02 | Dy Er Eu Ga Ga | 40.2 40.2 40.2 40.2 2 40.2 2 | 5 6 6 8 6 6 5 | 40.02 40.02 40.02 40.02 40.02 40.02 | Al As Ba Bi Bi | |
| | | (µg/mL) | ICP-MS | -MS): on by | metry (ICP-MS): Verification by ICP-MS | s Spectrom Metals V | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): Trace Metals Verification by | Plasma | Coupled | ctively | by Indu | nalysis | nental A | Instru | |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | | ₽M | terial Cl | nce Ma | Certified Reference Material CRM | Certifie | | | | | Inc. | | Absolute Standards, 800-368-1131 www.absolutestandards.com | Absolute 800-368-1131 www.absolute | 800- |



| Part# 57003 Lot # 062124 | * The certified value is the concentration calculated from gravimetric and volumer * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and 1 the preparation of all standards. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravinetrically using balances that are calibrated with w * Standards are certified (+/) 0.5% of the stated value, unless otherwise stated. * All Standards should be stored with caps tight and under appropriate iaboratory * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating of Measurement Result," NIST Technical Note 1297, U.S. Government Printing Off | Homogeneity: No heterogeneity was observed in the preparation of this standard. | Physical Characterization: | Al 40.02 Cid 40.02 Dr 40.02 Hd 3b 40.02 Cic 40.02 Ein 40.02 Hd As 40.2 Cic 40.02 Ein 40.02 In Ba 40.02 Cic 40.02 Gid 40.02 In Ba 40.02 Cic 40.02 Gid 40.02 In Ba 40.02 Cic 40.02 Gid 40.02 In Bi 40.02 Cic 40.02 Gid 40.02 In Bi 40.02 Cic 40.02 Gid 40.02 In Bi 40.02 Cic 40.02 Gid 40.02 Ia | | Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS): | Absolute Standards, Inc. 800-368-1131 www.absolutiestandards.com |
|---------------------------------|---|---|----------------------------|---|-------------|---|--|
| 2 01 2 | * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standard. * All standard containers are meticulously cleaned prior to use. * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated. * All Standards broud by stoud with cases tight and under appropriate laboratory conditions. * All Standards are prepared with cases tight and under appropriate laboratory conditions. * Mucertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). | this standard. | | 40/02 Li T Nh 40/02 Hr 40/02 And 40/02 Li An | -MS (µg/mL) | Mass Spectrometry (ICP-MS): | Certified Reference Material CRM |
| Printed: 6/24/2024, 11:20:08 PM | Ъ. | Sur P. S. | Certified by: | Site Gall Tite Gall U Gall Site Gall Site Gall U Gall Gall Site Gall Gall <thgall< th=""> <thgall< th=""> Gall<td></td><td></td><td>ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com</td></thgall<></thgall<> | | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |



Certificate of Analysis

Refine your results. Redefine your industry.

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--------------------------------------|
| Catalog Number: | CGIN10 |
| Lot Number: | U2-IN729349 |
| Matrix: | 5% (v/v) HNO3 |
| Value / Analyte(s): | 10 000 μg/mL ea: Indium |
| Starting Material: | Indium Metal |
| Starting Material Lot#: | 2511 |
| Starting Material Purity: | 99.9995% |
| CERTIFIED VALUES AN | ID UNCERTAINTIES |

| Certified Value: | 10022 ± 30 μg/mL |
|------------------|--|
| Density: | 1.044 g/mL (measured at 20 \pm 4 °C) |

Assay Information:

3.0

| Assay Method #1 | 10021 ± 56 μg/mL ICP Assay NIST SRM 3124a Lot Number: 110516 |
|-----------------|--|
| Assay Method #2 | 10035 ± 25 µg/mL EDTA NIST SRM 928 Lot Number: 928 |
| Assay Method #3 | 10001 ± 33 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2 |

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

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

Characterization of CRM/RM by Two or More Methods

Certified Value, X_{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}_{i} = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_i = (1/u_{char\,i})^2 / (\Sigma (1/(u_{char\,i})^2)$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k $(u^2_{char} + u^2_{bb} + u^2_{1ts} + u^2_{ts})^{1/2}$ k = coverage factor = 2 $u_{char} = [2((w_i)^2 (u_{char} i)^2)]^{1/2}$ where u_{char} i are the errors from each characterization method

- $\begin{array}{l} \text{construction} \quad \text{con$
- uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

$$\begin{split} \chi_{CRM/RM} = (X_n) \, (u_{cher\ n}) \\ \chi_n = mean\ of\ Assay\ Method\ A\ with \\ u_{cher\ n} = the\ standard\ uncertainty\ of\ characterization\ Method\ A \end{split}$$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k (u²_{cher} a + u²_{bb} + u²_{Hs} + u²_{ts})^½ k = coverage factor = 2 u_{char} a = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty u_{fts} = long term stability standard uncertainty (storage) u_{tt} = transport stability standard uncertainty

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

| М | Ag | < | 0.000760 | Μ | Eu | < | 0.000760 | 0 | Na | | 0.012771 | М | Se | < | 0.023000 | М | Zn | < | 0.006100 |
|---|----|---|----------|---|------|---|----------|---|----|---|----------|---|----|---|----------|---|----|---|----------|
| М | AI | | 0.003385 | 0 | Fe | | 0.004462 | М | Nb | < | 0.000760 | 0 | Si | | 0.024619 | М | Zr | < | 0.000760 |
| М | As | < | 0.004600 | М | Ga | < | 0.000760 | М | Nd | < | 0.000760 | М | Sm | < | 0.000760 | | | | |
| М | Au | < | 0.002300 | М | Gd | < | 0.000760 | 0 | Ni | < | 0.005100 | М | Sn | < | 0.000760 | | | | |
| 0 | в | | 0.003692 | М | Ge | < | 0.001600 | м | Os | < | 0.000760 | 0 | Sr | < | 0.000610 | | | | |
| М | Ba | < | 0.001600 | М | Hf | < | 0.000760 | n | Р | < | | М | Та | < | 0.000760 | | | | |
| 0 | Be | < | 0.000130 | М | Hg | < | 0.003100 | М | Pb | | 0.001400 | М | Tb | < | 0.000760 | | | | |
| Μ | Bi | < | 0.000760 | М | Ho | < | 0.000760 | Μ | Pd | < | 0.001600 | М | Те | < | 0.000760 | | | | |
| 0 | Ca | | 0.004616 | 5 | In | < | | М | Pr | < | 0.000760 | М | Th | < | 0.000760 | | | | |
| Μ | Cd | < | 0.000760 | М | lr – | < | 0.000760 | М | Pt | < | 0.000760 | 0 | Π | < | 0.001100 | | | | |
| М | Се | < | 0.000760 | 0 | к | | 0.007078 | М | Rb | < | 0.000760 | М | TI | < | 0.000760 | | | | |
| М | Со | < | 0.000760 | М | La | < | 0.000760 | М | Re | < | 0.000760 | M | Tm | < | 0.000760 | | | | |
| 0 | Cr | < | 0.001300 | 0 | Li | < | 0.000130 | М | Rh | < | 0.000760 | м | U | < | 0.000760 | | | | |
| М | Cs | < | 0.000760 | М | Lu | < | 0.000760 | М | Ru | < | 0.000760 | М | V | < | 0.001600 | | | | |
| М | Cu | < | 0.003800 | 0 | Mg | | 0.000707 | n | s | < | | М | W | < | 0.001600 | | | | |
| М | Dy | < | 0.000760 | 0 | Mn | | 0.000149 | М | Sb | < | 0.000760 | М | Y | < | 0.000760 | | | | |
| М | Er | < | 0.000760 | М | Мо | < | 0.002300 | М | Sc | < | 0.000760 | Μ | Yb | < | 0.000760 | | | | |
| | | | | | | | | | | | | | | | | | | | |

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 21, 2023

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

11.2 Lot Expiration Date

- February 21, 2028

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

DJ 78

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

R:2/22/24 MS-997

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Multi Analyte Custom Grade Solution | |
|---------------------|--|--------------------|
| Catalog Number: | CLPP-CAL-3 | |
| Lot Number: | T2-MEB727800 | |
| Matrix: | 7% (v/v) HNO3 | |
| Value / Analyte(s): | 1 000 μg/mL ea: Arsenic, Selenium, | Lead, Thallium, |
| | 500 μg/mL ea: Cadmium | |

3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE Arsenic, As | CERTIFIED VALUE 1 000 ± 7 µg/mL | ANALYTE Cadmium, Cd | CERTIFIED VALUE 500.0 ± 2.2 µg/mL |
|------------------------|------------------------------------|------------------------|--------------------------------------|
| Lead, Pb | 1 000 ± 4 µg/mL | Selenium, Se | 1 000 ± 6 µg/mL |
| Thallium, Tl | 1 000 ± 7 µg/mL | | |

Density:

1.042 g/mL (measured at 20 ± 4 °C)

Assay Information:

| soay morma | uon. | | |
|------------|------------|-----------|--------------|
| ANALYTE | METHOD | NIST SRM# | SRM LOT# |
| As | ICP Assay | 3103a | 100818 |
| As | Calculated | | See Sec. 4.2 |
| Cd | ICP Assay | 3108 | 130116 |
| Cd | EDTA | 928 | 928 |
| Pb | ICP Assay | 3128 | 101026 |
| Pb | EDTA | 928 | 928 |
| Se | ICP Assay | 3149 | 100901 |
| ті | ICP Assay | 3158 | 151215 |

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

Characterization of CRM/RM by Two or More Methods

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

$X_{CRM/RM} = \Sigma(w_j) (X_j)$

- X_i = mean of Assay Method i with standard uncertainty $u_{char i}$
- w_i = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_i = (1/u_{char})^2 / (\Sigma(1/(u_{char})^2))$

CRM/RM Expanded Uncertainty (1) = U_{CRM/RM} = k $(u^2_{char} + u^2_{bb} + u^2_{ts} + u^2_{ts})^{\frac{1}{2}}$ 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_{CRN/RM}, where one method of characterization is used is the mean of individual results:

 $X_{CRM/RM} = (X_{e}) (u_{char.e})$ X_{a} = mean of Assay Method A with $u_{char.e}$ = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k {u²_{char a} + u²_{bb} + u²_{its} + u²_{ts}}^{1/2} k = coverage factor = 2 u_{char a} = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty u_{its} = long term stability standard uncertainty (storage) u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

December 21, 2022

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

11.2 Lot Expiration Date

- December 21, 2027

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date: _

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

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

DD978

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



R: 08/22/24 MG058 MG059

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Multi Analyte Custom Grade Solution | |
|---------------------|-------------------------------------|-------------|
| Catalog Number: | CHEM-CLP-4 | |
| Lot Number: | V2-MEB746172 | |
| Matrix: | 3% (v/v) HNO3 3% (v/v) HF | |
| Value / Analyte(s): | 1 000 μg/mL ea: | |
| | Boron, | Molybdenum, |
| | Silicon, | Tin, |
| | Titanium | |

3.0 CERTIFIED VALUES AND UNCERTAINTIES

| CERTIFIED VALUE 1 000 ± 5 µg/mL | ANALYTE Molybdenum, Mo | CERTIFIED VALUE 1 000 ± 5 µg/mL | |
|------------------------------------|--|--|---|
| 1 000 ± 7 µg/mL | Tin, Sn | 1 000 ± 5 µg/mi. | |
| 1 000 ± 6 µg/mL | | | |
| 1.032 g/mL (measure | ed at 20 ± 4 °C) | | |
| | | | |
| METHOD | NIST SRM# | | SRM LOT# |
| ICP Assay | 3107 | | 190605 |
| Calculated | | | See Sec. 4.2 |
| ICP Assay | traceable to 3134 | | U2-MO739068 |
| ICP Assay | Traceable to 3150 | | S2-SI702546 |
| ICP Assay | 3161a | | 140917 |
| ICP Assay | traceable to 3162a | 1 | T2-T1725816 |
| | 1 000 ± 5 μg/mL 1 000 ± 7 μg/mL 1 000 ± 6 μg/mL 1.032 g/mL (measure METHOD ICP Assay Calculated ICP Assay ICP Assay ICP Assay | Molybdenum, Mo 1 000 ± 5 μg/mL Tin, Sn 1 000 ± 7 μg/mL Tin, Sn 1 000 ± 6 μg/mL 1.032 g/mL (measured at 20 ± 4 °C) METHOD NIST SRM# ICP Assay 3107 Calculated ICP Assay ICP Assay Traceable to 3134 ICP Assay Traceable to 3150 ICP Assay 3161a | Molybdenum, Mo 1 000 ± 5 μg/mL 1 000 ± 7 μg/mL TIn, Sn 1 000 ± 5 μg/mL 1 000 ± 6 μg/mL TIn, Sn 1 000 ± 5 μg/mL 1 000 ± 6 μg/mL 1 000 ± 6 μg/mL 1 000 ± 5 μg/mL 1 000 ± 6 μg/mL NIST SRM# I CP Assay ICP Assay 3107 Calculated ICP Assay traceable to 3134 ICP Assay 3161a |

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i = mean of Assay Method i with standard uncertainty uchar i
- \mathbf{w}_{l} = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_i = (1/u_{char i})^2 / (\Sigma(1/(u_{char i})^2))$

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

- k = coverage factor = 2
- $u_{cher} = \left[\Sigma((w_j)^2 (u_{char,j})^2)\right]^{\frac{1}{2}}$ where $u_{char,j}$ 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

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

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

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{chara} + u^2_{bb} + u^2_{its} + u^2_{ts}$)^½ k = coverage factor = 2 uchara = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty u_{its} = long term stability standard uncertainty u_{its} = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty (storage)

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

August 12, 2024

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

11.2 Lot Expiration Date

- August 12, 2029

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

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

- 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:

Joseph Burns **Custom VS Manager**

Paul R Saines

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis MGO 7Y

M6075 M6076

M6077

300 Technology Drive Christiansburg, VA 24073 USA 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).

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





2.0 **PRODUCT DESCRIPTION**

| Product Code: | Multi Analyte Custom Grade Solution | |
|---------------------|-------------------------------------|-------------|
| Catalog Number: | CHEM-CLP-4 | |
| Lot Number: | V2-MEB746762 | |
| Matrix: | 3% (v/v) HNO3 3% (v/v) HF | |
| Value / Analyte(s): | 1 000 µg/mL ea: | Molubdopum |
| | Boron, | Molybdenum, |
| | Silicon, | Tin, |
| | Titanium | |

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

| ANALYTE Boron, B | CERTIFIED VALUE 1 000 ± 5 µg/mL | ANALYTE Molybdenum, Mo | CERTIFIED VALUE 1 000 ± 5 µg/mL |
|---------------------|------------------------------------|---------------------------|------------------------------------|
| Silicon, Si | 1 000 ± 7 μg/mL | Tin, Sn | 1 000 ± 5 μg/mL |
| Titanium, Ti | 1 000 ± 6 µg/mL | | |
| Density: | 1.033 g/mL (measur | ed at 20 ± 4 °C) | |
| Assay Information: | | | |

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

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i = mean of Assay Method i with standard uncertainty $u_{char i}$
 - w_j = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_i = (1/u_{char i})^2 / (\Sigma(1/(u_{char i})^2))$

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

- $u_{char} = \left[\sum ((w_i)^2 (u_{char})^2) \right]^{\frac{1}{2}}$ where u_{char} i are the errors from each characterization method
- ubb = bottle to bottle homogeneity standard uncertainty
- ults = long term stability standard uncertainty (storage)
- uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

 $\begin{array}{l} X_{CRM/RM}=(X_{a}) \left(u_{char\,a}\right) \\ X_{a}= mean of Assay Method A with \\ u_{char\,a}= the standard uncertainty of characterization Method A \end{array}$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{chere} + u^2_{bb} + u^2_{ts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 $u_{chara} = the errors from characterization$ $<math>u_{bb} =$ bottle to bottle homogeneity standard uncertainty $u_{ts} = long term stability standard uncertainty (storage)$

u_{ts} = transport stability standard uncertainty u_{ts} = transport stability standard uncertainty

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669,6799; 540.585.3030, Fax: 540.585,3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 06, 2024

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

11.2 Lot Expiration Date

- September 06, 2029

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

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

- Sealed TCT Bag Open Date: ____

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Joseph Burns **Custom VS Manager**

Paul R Saines

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis MGO 7Y

M6075 M6076

M6077

300 Technology Drive Christiansburg, VA 24073 USA 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).

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





2.0 **PRODUCT DESCRIPTION**

| Product Code: | Multi Analyte Custom Grade Solution | |
|---------------------|-------------------------------------|-------------|
| Catalog Number: | CHEM-CLP-4 | |
| Lot Number: | V2-MEB746762 | |
| Matrix: | 3% (v/v) HNO3 3% (v/v) HF | |
| Value / Analyte(s): | 1 000 µg/mL ea: | Molubdopum |
| | Boron, | Molybdenum, |
| | Silicon, | Tin, |
| | Titanium | |

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

| ANALYTE Boron, B | CERTIFIED VALUE 1 000 ± 5 µg/mL | ANALYTE Molybdenum, Mo | CERTIFIED VALUE 1 000 ± 5 µg/mL |
|---------------------|------------------------------------|---------------------------|------------------------------------|
| Silicon, Si | 1 000 ± 7 μg/mL | Tin, Sn | 1 000 ± 5 μg/mL |
| Titanium, Ti | 1 000 ± 6 µg/mL | | |
| Density: | 1.033 g/mL (measur | ed at 20 ± 4 °C) | |
| Assay Information: | | | |

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

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i = mean of Assay Method i with standard uncertainty $u_{char i}$
 - w_j = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_i = (1/u_{char i})^2 / (\Sigma(1/(u_{char i})^2))$

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

- $u_{char} = \left[\sum ((w_i)^2 (u_{char})^2) \right]^{\frac{1}{2}}$ where u_{char} i are the errors from each characterization method
- ubb = bottle to bottle homogeneity standard uncertainty
- ults = long term stability standard uncertainty (storage)
- uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

 $\begin{array}{l} X_{CRM/RM}=(X_{a}) \left(u_{char\,a}\right) \\ X_{a}= mean of Assay Method A with \\ u_{char\,a}= the standard uncertainty of characterization Method A \end{array}$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{chere} + u^2_{bb} + u^2_{ts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 $u_{chara} = the errors from characterization$ $<math>u_{bb} =$ bottle to bottle homogeneity standard uncertainty $u_{ts} = long term stability standard uncertainty (storage)$

u_{ts} = transport stability standard uncertainty u_{ts} = transport stability standard uncertainty

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

N/A

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

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- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 06, 2024

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

11.2 Lot Expiration Date

- September 06, 2029

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

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

- Sealed TCT Bag Open Date: ____

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Joseph Burns **Custom VS Manager**

Paul R Saines

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

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

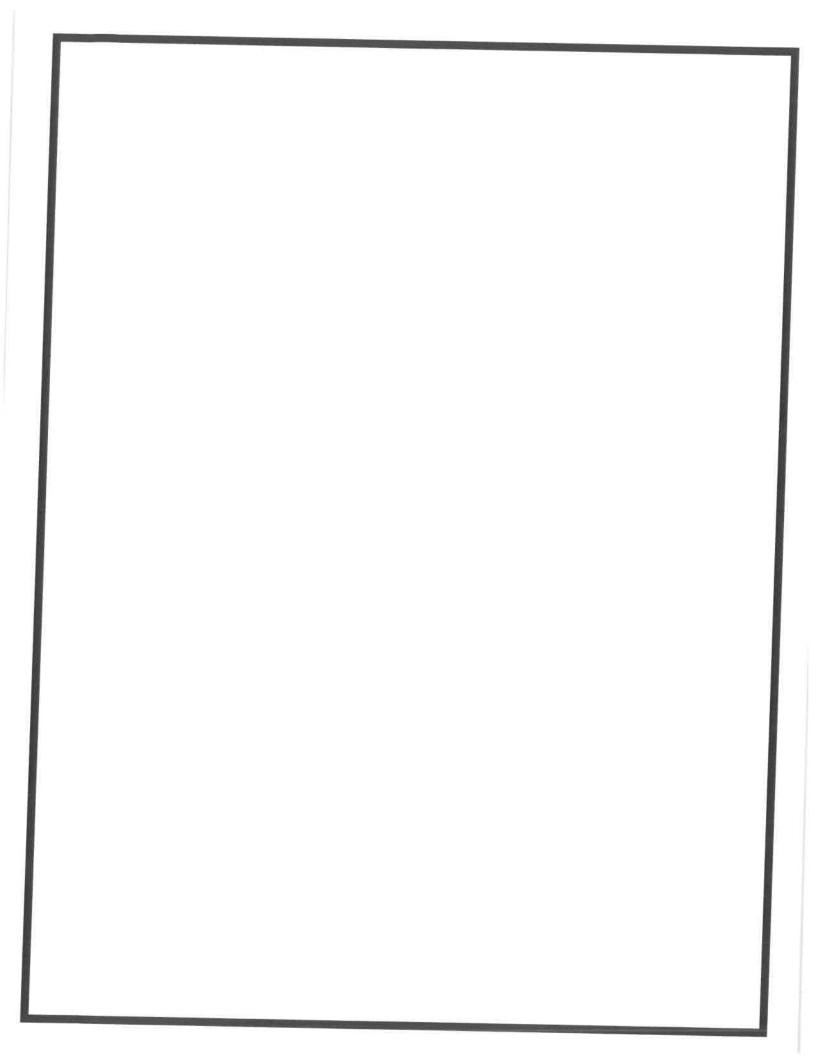
Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

Office and Plant 299 Cedar Lane Fairless Hills, PA 19030

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

Hydrogen Peroxide 30%, ACS Reagent Grade

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







R-> 11/12/24 TH6126

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

Certificate of Analysis

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

>>> Continued on page 2 >>>

Nitric Acid 69% CMOS





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

| Test | Specification | Result | |
|------|---------------|--------|--|
| | | | |

For Microelectronic Use

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



| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: | Setting Certified Reference Material CRM Setting National 112124 N.S. I/I/3/250/vent: 24012496 Magnesium (Mg) N.S. I/I/3/250/vent: 24012496 Nitric Acid 112127 N.G. V.Y. 2% 40.0 Nitric Acid 112127 M.G.V.Y. 2% 40.0 Nitric Acid 112127 M.G.V.Y. 2% 40.0 Nitric Acid 110000 GUTB 5E-05 Balance Uncertainty 5E-05 | Formulated By: |
|---|--|--|
| Weight shown below was diluted to (mL): | 2000.07 0.100 Fask Uncertainty 2000.07 0.100 Fask Uncertainty Nominal Purthy Uncertainty Assay Target Actual Conc. (ug/mL) (%) Purthy (%) (%) Weight (g) | Expanded SDS Information Actual Uncertainty Uncertainty (Solvent Safety Info. On Attached pg.) Conc. (ug/mL) +/- (ug/mL) CAS# OSHA PEL (TWA) |
| 1. Magnesium nitrate hexahydrate (Mg) IN030 Mgposzoza41 | 10000 98.999 0.10 8.51 234.9183 234.9459 | 20.0 13446-18-9 NA orf-rat |
| [1] Spectrum No.1 1.0E6 | [19.923 sec];58112.D# [Count] [Linear] | |
| g. Oeg | | |
| m/≈-> 10 2000 | 20 30 40 50 6 0 | 70 80 90 100 |
| 1000 | | |
| m/z-> 110 2.0厘4 | 120 130 140 150 160 | 170 180 190 200 |
| m/z-≫ 210 | 220 230 240 250 260 | |
| | | |

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



Certified Reference Material CRM



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

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

| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | - | 20.02 | | 20.05 | 18 | <0.0Z | × | 40.2 | ĸ | <0.02 | Nd | <0.02 | Рb | <0.02 | Au | <0.02 | ç | <0.02 | 8 |
|--|--|-----|-----|-------|-----|-------|-----|-------|-----|-------|----|-------|----|-------|-----|-------|----------|-------|----------------|-------|-----|
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ | λ. | 21 | 2002 | 9 8 | 0.02 | 3 6 | 10.02 | 311 | 20.02 | 2 | <0.02 | MO | 20.05 | 5 | Z0102 | ନ୍ନ | <0.02 | S | <0.02 | æ. |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 4 | Zn | -0.02 | 2 | 2002 | 0 | 5 | 2 | 3 | 2 | 3 | | 200 | 1 (| | | 10.02 | 1 | 10.01 | Ş |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 6 | Y | <0.02 | Tm | <0.02 | S | <0.02 | Ru | <0.02 | ŋ | 40,2 | Hø | 40.2 | 21 | 40.02 | <u>.</u> | AD 03 | 2 | 100 | E . |
| 40.02 Cd 40.02 Dy 40.02 Hf 40.02 Li 40.02 Ni 40.02 Pr 40.02 Se 40.2 Th 40.02 W 40.02 Ca 40.2 Er 40.02 Hf 40.02 Li 40.02 Pr 40.02 Se 40.2 Th 40.02 W 40.02 Ca 40.2 Er 40.02 Ha 40.02 Nb 40.02 Re 40.02 Si 40.02 T 40.02 V 40.02 V | 40.02 Cd 40.02 Dy 40.02 Hf 40.02 Li 40.02 Ni 40.02 Pr 40.02 Se 40.2 Tb 40.02 W 40.02 Ca 40.2 Er 40.02 Hf 40.02 Li 40.02 N 40.02 Se 40.2 Tb 40.02 U 40.02 Ca 40.02 Hr 40.02 Li 40.02 Nb 40.02 Se 40.2 Tb 40.02 U 40.02 Ca 40.02 Hr 40.02 Mg T 0s 40.02 Rb 40.02 Tb 40.02 U 40.02 Ca 40.02 In 40.02 Mg T 0s 40.02 Rb 40.02 Tb 40.02 V 40.02 Ca 40.02 In 40.02 Mg T 0s 40.02 Rb 40.02 Tb 40.02 V 40.02 Fin 40.02 Mg T 0s 40.02 Rb 40.02 | . 6 | IO | 20.02 | 10 | 40.2 | Næ | <0.02 | Rb | <0.02 | Pd | <0.02 | Mn | <0.02 | ŀ | <0.02 | R | <0.02 | S | <0.02 | Ba |
| Cd CD Li < | 40.02 Cd 40.02 Dy 40.02 Hf 40.02 Li 40.02 Ni 40.02 Pr 40.02 Se 40.2 Tb 40.02 W 40.02 Ca 40.2 Er 40.02 Hf 40.02 Li 40.02 Nb 40.02 Se 40.2 Tb 40.02 U 40.02 Ca 40.02 Ho 40.02 Lu 40.02 Nb 40.02 Si 40.02 Tc 40.02 U | 56 | ģ < | 20.02 | | 20.02 | Ag | <0.02 | Rb | <0.02 | 0s | Ţ | Mg | <0.02 | In | <0.02 | 臣 | <0.02 | ŝ | <0.2 | As |
| | <th< td=""><td>3 6</td><td>4 0</td><td>20.02</td><td>1</td><td>20.02</td><td>2</td><td>20.02</td><td>KC</td><td><0.02</td><td>NP</td><td><0.02</td><td>Lu</td><td><0.02</td><td>Но</td><td><0.02</td><td>막</td><td>40.2</td><td>C₂</td><td><0.02</td><td>SP</td></th<> | 3 6 | 4 0 | 20.02 | 1 | 20.02 | 2 | 20.02 | KC | <0.02 | NP | <0.02 | Lu | <0.02 | Но | <0.02 | 막 | 40.2 | C ₂ | <0.02 | SP |
| | | 3 | ; | 3 | 3 3 | 5 | a g | 10.02 | 1 | 0.02 | 1 | <0.02 | F | 20.02 | HI | 20.02 | Ŋ | <0.02 | 2 | <0.02 | A |
| | | 4 | W | 40.02 | 7 | c (b) | S | and | Dr | 3 | | 2003 | 1 | 200 | | | | | | | |

(I) = larget analyte

Physical Characterization:

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

Son P. A.

Certified by:

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

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

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

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

* All standards should be stored with caps tight and under appropriate laboratory conditions. * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST

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

Part # 58112 Lot # 112124

| Dat # 60036 101 # | m/z->- | 5.067 | m/z-> 1.0⋿8 | 5.067 | m/≥-> 1.0E8 | N.5 8 | 5.006 | 1. Manganese(II) nitrate hydrate (Mn) | Weight sh Compound | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: | CERTIFIED WEIGHT REPORT: Part I Lot Des | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|--------------------------------|-------------|-------|----------------|-------|----------------|----------|---|---------------------------------------|---|---|--|--|
| Lot # 101124 | Ņ | | 110 | | 10 | | [1] Spectrum No.1 | | Weight shown below was diluted to (mL): Lot RM# Number | Expiration Date: Recommended Storage: Il Concentration (µg/mL): NIST Test Number: | <u>Part Number:</u> Lot Number: Description: | s, Inc. |
| | N N O | | 120 | | 0 0 | | | A1 | | õ | 58025 101124 Manganese (Mn) | |
| | N. 0 | | 100 | | ۵ Ö | | [34.243 sec]:57025.D# [Count] [Linear] | 1000 99.999 | 4000.2 0.10 Fit Nominal Purity U Cone. (ug/mL) (%) F | Ś | R-71/13/2& Solvent: | Се |
| _ | N 4 0 | | 140 | | 4 0 | | 25.D# [Count] | 0.10 20.8 | 0.10 Flask Uncertainty Purity Uncertainty Assay (%) Purity (%) (%) | SE-05 Balance Uncertainty | | rtified Referen |
| 1 of 2 | 260 260 | | 150 160 | | 0. 0. | | [Linear] | | Target Actual Weight (g) Weight (g) | (mL) Nitric Acid | 46 | Certified Reference Material CRM |
| | | | 170 | | 70 | | | | Actual Conc. (ug/mL) | (| | M |
| Prin | | | 180 | | 8 | | | 2.0 15710-66-4 | Expanded Uncertainty (SolVe +/- (µg/mL) CAS# | Pormulated by: | Giovannie | |
| Printed: 1/10/2025, 4:51:16 PM | | | 190 | | 80 | | | 5 mg/m3 | SDS Information (Solvent Safety Info. On Attached pg.) S# OSHA PEL (TWA) LD50 | Pedro L. Rentas | Especite | ANA AR- https: |
| :51:16 PM | | | N 0 0 | | 100 | | | orl-rat >300mg/kg | ttion Attached pg.) LD50 | 101124 | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |
| | | | | | | | | g 3132 | NIST | <u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u> | | Accredited e Number Jards.com |

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





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

| Г | | | | | | | Trace Mo | etals | Verifica | ition | by ICP- | Ś | (µg/mL) | | | | | | |
|----|-------|----|-------|-----|-------|----|----------|-------|----------|-------|---------|-----|---------|----|-------|----|-------|----------------|-------|
| | 3 | 2 | 2000 | | 5 | | 200 | | | | | | | | | | | | |
| Al | <0.02 | 8 | <0.02 | Ðy | <0.02 | Hf | <0.02 | 5 | <0.02 | N | <0.02 | Ŗ | <0.02 | Se | 40.2 | ТЪ | <0.02 | W | <0.02 |
| Sb | <0.02 | Q | <0.2 | Ę | <0.02 | Ho | <0.02 | Ę | <0.02 | N | <0.02 | Re | <0.02 | S | <0.02 | Te | <0.02 | C | <0.02 |
| As | <0.2 | ଚ | <0.02 | Eu | <0.02 | In | <0.02 | Mg | <0.01 | °s | <0.02 | RJ. | <0.02 | Ag | <0.02 | Ξ | <0.02 | < | <0.02 |
| Ba | <0.02 | Ç | <0.02 | ଜୁ | <0.02 | F, | <0.02 | Mn | Н | Pd | <0.02 | Rb | <0.02 | Na | <0.2 | П | <0.02 | Υ _b | <0.02 |
| Be | <0.01 | ភ្ | <0.02 | ဌ | <0.02 | Fe | <0.2 | Hg | <0.2 | ъ | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | × | <0.02 |
| Bi | <0.02 | S | <0.02 | ନ୍ଚ | <0.02 | La | <0.02 | Mo | <0.02 | P | <0.02 | Sm | <0.02 | s | <0.02 | Sn | <0.02 | Zn | <0.02 |
| в | <0.02 | Q | <0.02 | Au | <0.02 | РЬ | <0.02 | Nd | <0.02 | ĸ | <0.2 | Sc | <0.02 | Ta | <0.02 | E | <0.02 | Zr | <0.02 |
| | | | | | | | | | | | | | | | | | | | |

(T) = Target analyte

Physical Characterization:

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

for P. S.

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

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

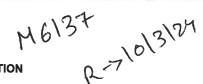
* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Part # 58025 Lot # 101124



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com



ACCREDITATION / REGISTRATION 1.0

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

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



2.0 **PRODUCT DESCRIPTION**

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--|
| Catalog Number: | CGSI1 |
| Lot Number: | V2-SI744713 |
| Matrix: | tr. HNO3 tr. HF |
| Value / Analyte(s): | 1 000 μg/mL ea: Silicon |
| Starting Material: | Silica |
| Starting Material Lot#: | 1771 |
| Starting Material Purity: | 99.9981% |
| CERTIFIED VALUES AN | D UNCERTAINTIES |
| Certified Value: | 999 ± 6 µg/mL |
| Density: | 1.003 g/mL (measured at 20 \pm 4 °C) |

Assay Information:

3.0

| Assay Method #1 | 999 ± 5 μg/mL ICP Assay NIST SRM Traceable to 3150 Lot Number: S2-SI702546 |
|-----------------|--|
| Assay Method #2 | 1000 ± 7 μg/mL |

1000 ± 7 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2

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

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

Characterization of CRM/RM by Two or More Methods

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

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

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

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

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k (u²_{char} + u²_{bb} + u²₁₅ + u²₁₅)^{1/2} k = coverage factor = 2 u_{char} = [2((w_i)² (u_{char})²)]^{1/2} where u_{char} is the errors from each characterization method u_{bb} = bottle to bottle homogeneity standard uncertainty

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

Characterization of CRM/RM by One Method Certified Value, X_{CRMRM}, where one method of characterization

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

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

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k $(u^2_{chara} + u^2_{bb} + u^2_{its} + u^2_{ts})^{Y_b}$ k = coverage factor = 2 $u_{chara} =$ the errors from characterization $u_{bb} =$ bottle to bottle homogeneity standard uncertainty $u_{its} =$ long term stability standard uncertainty (storage) $u_{its} =$ tansport stability standard uncertainty

4.0 TRACEABILITY TO NIST

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

| M | Ag | < | 0.000310 | М | Eu | < | 0.000310 | 0 | Na | | 0.001656 | М | Se | < | 0.022000 | М | Zn | < | 0.002500 |
|---|----|---|----------|---|----|---|----------|---|----|---|----------|-----|----|---|----------|---|----|---|----------|
| М | Al | | 0.010787 | М | Fe | < | 0.027000 | М | Nb | < | 0.001300 | s | Si | < | | 0 | Zr | < | 0.001900 |
| М | As | < | 0.001900 | М | Ga | < | 0.001300 | М | Nd | < | 0.000310 | м | Sm | < | 0.000310 | | | | |
| M | Au | < | 0.000910 | М | Gd | < | 0.000310 | Μ | Ni | < | 0.005500 | м | Sn | | 0.000096 | | | | |
| M | в | | 0.016180 | М | Ge | < | 0.001900 | М | Os | < | 0.000610 | 0 | Sr | | 0.000092 | | | | |
| Μ | Ba | | 0.000096 | М | Hf | | 0.000423 | i | Р | < | | M | Та | | 0.002542 | | | | |
| 0 | Be | < | 0.000570 | М | Hg | < | 0.000610 | М | Pb | < | 0.000310 | | | < | 0.000310 | | | | |
| М | Bi | < | 0.000310 | М | Но | < | 0.000610 | м | Pd | < | 0.000610 | | _ | < | 0.000910 | | | | |
| 0 | Са | | 0.011557 | М | in | < | 0.000310 | М | Pr | < | 0.000310 | | | < | 0.001900 | | | | |
| М | Cď | < | 0.000310 | M | lr | < | 0.000310 | м | | < | 0.000310 | | П | - | 0.001078 | | | | |
| М | Се | < | 0.000610 | 0 | ĸ | | 0.000577 | | Rb | | 0.009100 | | | < | 0.000310 | | | | |
| М | Co | < | 0.001600 | M | La | < | 0.000310 | | Re | | 0.000310 | | Tm | | | | | | |
| М | Cr | < | 0.010000 | | Li | < | 0.000460 | | Rh | | | | | | 0.000310 | | | | |
| | | | | - | | | | | | | 0.000310 | IVI | U | < | 0.000310 | | | | |
| M | Cs | < | 0.000310 | M | Lu | < | 0.000310 | M | Ru | < | 0.000310 | 0 | V | < | 0.001300 | | | | |
| М | Cu | < | 0.002500 | 0 | Mg | | 0.001348 | 0 | S | < | 0.570000 | М | W | < | 0.001900 | | | | |
| М | Dy | < | 0.000310 | М | Mn | < | 0.002500 | М | Sb | < | 0.000310 | М | Y | < | 0.000310 | | | | |
| М | Er | < | 0.000310 | М | Мо | < | 0.000310 | 0 | Sc | < | 0.000590 | M | Yb | < | 0.000310 | | | | |
| | | | | | | | | | | | | | | | | | | | |

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

QUALITY STANDARD DOCUMENTATION 10.0

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 10, 2024

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

11.2 Lot Expiration Date

- July 10, 2029

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

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

11.3 Period of Validity

Sealed TCT Bag Open Date:

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 **Certificate Prepared By:**

Uyen Truong Custom Processing Supervisor

Aleya Mung Monggini Kh Paul R Laina

Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Page 4 of 4

| sredited Number ds.com | | NIST SRM 3109a | | |
|--|--|---|--|--|
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | 121824 121824 | by/du | | |
| AN/ AR https: | Giovanni Esposito Giovanni Esposito Pedro L. Rentas SDS Information | (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD50 # -1 5 mg/m3 ort-rat >2000 | | |
| | | CAS 471-3 | S O C | |
| | Formulated B Reviewed By: | Actual Uncertainty Conc. (pg/mL) +/- (ug/mL) 10001.4 20.0 | 2 7 0 | |
| terial CRM | Nitric Acid Nitric Acid | Actual A Weight (g) Conc 100.2677 10 | asr] 260 260 | |
| ference Ma | Lot # 24012496 80.0 (mL) | Target Weight (g) 100.2537 | 0 50 40 150 1012 | |
| Certified Reference Material CRM | 11312-5 Solvent: Solvent: 2% 2% 5% 5% 0.15 Flask Uncertainty 0.15 Flask Uncertainty | Uncertainty Assay Purity (%) (%) 0.10 39.9 | | |
| N6138 | A | Nominal Purity Conc. (ug/mL) (%) 10000 88.899 | 12.514 sec].58120 130 230 2 | |
| | 20 °C) | Lot Number 4 CAD032023B3 | 2 30 15 20 20 10 10 10 10 10 10 10 10 10 10 10 10 10 | |
| Jards, Inc. ds.com | (EIGHT REPORT: 58120 Part Number: 58120 Lot Number: 121824 Description: 121827 Expiration Date: 121827 Recommended Storage: Ambient (3 I Concentration (µg/mL): 10000 NIST Test Number: 6UTB Weight shown below was diluted to (mL): | | E4 [1] Spectrum No.1 E4 10 10 110 E5 210 210 Lot #121824 | |
| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | CERTIFIED WEIGHT REPORT: Part Number: Lot Number: Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa: | Compound 1. Calcium carbonate (Ca) | 2.0E4 2.0E4 1.0E4 m/2-> 2.5E4 2.5E4 1.0E5 1.0E5 1.0E5 1.0E5 2.0E4 2.0E4 2.0E4 1.0E5 1. | |

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





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

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

| -6.02 Cd -6.02 Dy -6.02 Hf -6.02 Li -6.02 Ni -6.02 Pr -6.02 -6.02 Ca T Er -6.02 Ho -0.02 Lu -6.02 Pr -6.02 -6.02 Ca T Er -6.02 Lu -6.02 Nb -6.02 Rr -6.02 -6.02 Ce -0.02 Eu -6.02 In -6.02 Re -6.02 -6.02 Cs -6.02 In -6.02 Na -6.02 Re -6.02 -6.02 Ga -6.02 Nn -6.02 Re -6.02 -6.02 Ga -6.02 Nn -6.02 Re -6.02 -6.02 Ga -6.02 Fe -6.02 Re -6.02 -6.02 Ga -6.02 Fe -6.02 Re -6.02 Re -6.02 -6.02 Ga -6.02 | | Contraction of the local distribution of the | | and the second s | | the state of the s | | ALC: NO WAY AND AND | | ALL ALL ALL | 10 | State of Sta | 100 | | | | TO THE | a la la la la la | | |
|--|-----|--|----|--|----|--|---------|---------------------|----|-------------|----|--|-----|-------|----|-------|---------|------------------|-------|-------|
| <0.02 | | | | | | | | | | | | 1 | | 0.000 | | | 1.11 | | 1 127 | 0007 |
| -0.02 Ca T Er -0.02 Ho -0.02 Lu -0.02 Nb -0.02 Si -0.12 Ce -0.02 Eu -0.02 In -0.02 Re -0.02 Si -0.12 Ce -0.02 Eu -0.02 In -0.02 Re -0.02 Si -0.02 Ca -0.02 Fr -0.02 Mn -0.02 Rh -0.02 Na -0.01 Cr -0.02 Fr -0.02 Mn -0.02 Ru -0.02 Na -0.01 Cr -0.02 Fr -0.02 Nn -0.02 Ru -0.02 Na -0.01 Cr -0.02 Fr -0.02 Ru -0.02 Ru -0.02 Na -0.01 Cr -0.02 Fr -0.02 Ru -0.02 Sr -0.02 Na -0.01 Cr -0.02 Fr -0.02 Ru -0.02 Sr -0.02 Na -0.02 Fr -0.02 | | <0.02 | G | <0.02 | Dy | <0.02 | Hf | <0.02 | - | <0.02 | ī | <0.02 | Ł | <0.02 | Se | 202 | 1 | 70702 | * | 70.02 |
| <0.2 Ce <0.02 Eu <0.02 In <0.02 Mg <0.01 Os <0.02 Rh <0.02 Ag <0.01 | م | <0.02 | Ç | L | ц | <0.02 | Ю | <0.02 | Ľ | <0.02 | qN | <0.02 | Re | <0.02 | Si | <0.02 | le e | <0.02 | Þ | <0.02 |
| <<p>< <0.02</p> Cs < <0.02 Gd < <0.02 Ir < <0.02 Mn < <0.02 Pd < <0.02 Rb < <0.02 Rb < <0.02 Rb < <0.02 Rb < <0.02 Ru < <0.02 Sr < | 5 | <0.2 | ő | <0.02 | Eu | <0.02 | П | <0.02 | Mg | <0.01 | ő | <0.02 | Rh | <0.02 | Ag | <0.02 | F | <0.02 | > | <0.02 |
| <0.01 Cr <0.02 Ga <0.02 Fe 30 Hg <0.2 P <0.02 Ru <0.02 Sr | R | <0.02 | ඊ | <0.02 | 3 | <0.02 | П | <0.02 | Mn | <0.02 | Ρđ | <0.02 | Rb | <0.02 | Na | <0.2 | f | <0.02 | Å | <0.02 |
| | : 0 | <0.01 | ບ້ | <0.02 | Ga | <0.02 | Fe | 30 | Hg | <0.2 | д, | <0.02 | Ru | <0.02 | Sr | <0.02 | Tm | <0.02 | ¥ | <0.02 |
| <0.02 Co <0.02 Ge <0.02 Le <0.02 La <0.02 Mo <0.02 F1 <0.02 3m <0.02 3 3 | | <0.02 | ථ | <0.02 | ő | ≤0.02 | La | <0.02 | Mo | <0.02 | 武 | <0.02 | Sm | <0.02 | s | <0.02 | Sn | <0.02 | Zn | <0.02 |
| Cu <0.02 Au <0.02 Pb <0.02 Nd <0.02 K <0.2 Sc <0.02 Ta - | | <0.02 | ð | <0.02 | Au | <0.02 | PP P | <0.02 | PN | <0.02 | м | <0.2 | Sc | <0.02 | Ta | <0.02 | Ħ | <0.02 | Zr | <0.02 |

Physical Characterization:

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

in P.

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 (+ \bar{I} -) 0.5% of the stated value, unless otherwise stated.

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

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

| m/z-> | \$ 000 | m/z-≻ 1.0E4 | -1 .0 M 03 | m/z-> 2.0E5 | 1.068 | 2.000 | 1. Potassium nitrate (K) | Compound | NIST Te Weight show | Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): | <u>CERTIFIED WEIGHT REPORT:</u> Part Lot De | 800-368-1131 www.absolutestandards.com |
|--------|-----------|----------------|---------------------|----------------|-------|---------------------------------------|--------------------------|---|---|--|---|--|
| N 0 | | 110 | | 1 0 | | [1] Spectrum No.1 | IN034 | RM# | NIST Test Number: 6UTB Weight shown below was diluted to (mL): | Expiration Date: nended Storage: ntration (µg/mL): | ORT: Part Number: Lot Number: Description: | 3 3 |
| | | 120 | | 20 | | - | IN034 KD062022A1 | Lat | | 103027 Ambient (20 °C) 10000 | <u>57119</u> <u>103024</u> Potassium († | |
| | | 1 0 0 | | a | | 35.763 sec]:58119.D# [Count] [Linear] | 10000 99.999 | Nominal Purity Conc. (µg/mL) (%) | 5E-05 4000.1 0.15 | M6143 | $\frac{57119}{103024} R \rightarrow 1/13/2.5$ $\frac{103024}{1043} M 61/11$ | |
| | | 1. 0 | | 40 | | 8119.D# [C | 0.10 37.7 | Uncertainty Assay Purity (%) (%) | 5E-05 Balance Uncertainty 0.15 Flask Uncertainty | | Solvent: | Certified Re |
| | | 150 | | 07. O | | ount] [Lines | 106.1040 | y Target Weight (g) | | | Lot # t: 24002546 | Certified Reference Material CRM |
| | | 10- 0 | | 0 | | 'n | ##### 100 | Actual Act Weight (g) Conc. | | | Nitric Acid | erial CRM |
| | | 170 | | 0 | | | 10001.1 20.0 | Expanded Actual Uncertainty Conc. (µg/mL) +/- (µg/mL) | Reviewed By: | X | Hierat | |
| | | 180 | | 80 | | | 7757-79-1 | CAS# | | \$ | Vie. | |
| | | 061 | | 80 | | | 5 mg/m3 | SDS Information (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) | Pedro L. Rentas | tento | Capestite Giovanni Esposito | http |
| | | 200 | | 100 | | | orl-rat 3750 mg/kg 3141a | n Attached pg.) A) LD50 | 103024 | | 103024 | AIVAD ISO 17034 Accreated AR-1539 Certificate Number https://Absolutestandards.com |
| | | | | | | | vkg 3141a | NIST | 124 | | 24 | 4 Accredit ate Numb ndards.cc |

Part # 57119 Lot # 103024

1 of 2

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Certified Reference Material CRM



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

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

| | | | | | | | Trace Me | etals | Verifica | ition | by ICP- | MS (| (Jug/mL) | | | | | | |
|----|-------|----|-------|-----|-------|----|----------|-------|----------|-------|---------|------|----------|----|-------|----|-------|----------------|-------|
| A | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02 | 5 | <0.02 | Ni | <0.02 | 7 | <0.02 | Se | A0.2 | Тb | 40.02 | W | 40.02 |
| SP | <0.02 | ß | A0 2 | 말. | <0.02 | Но | <0.02 | L | <0.02 | ß | <0.02 | Re | <0.02 | ŝ | <0.02 | Te | <0.02 | e | <0.02 |
| As | <0.2 | ĉ | <0.02 | 臣 | <0.02 | ľ | <0.02 | Mg | <0.01 | õ | <0.02 | Rß | <0.02 | Ag | <0.02 | Ξ | <0.02 | < | <0.02 |
| Ba | <0.02 | ŝ | <0.02 | ଜ | <0.02 | ŀ | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | 40.2 | ТЪ | <0.02 | Υ _b | <0.02 |
| Be | <0.01 | ç | <0.02 | ဌာ | <0.02 | Fe | <02 | Hg | <0.2 | P | <0.02 | Ru | <0.02 | ST | <0.02 | Im | <0.02 | Y | <0.02 |
| Bi | <0.02 | S | <0.02 | ନ୍ଚ | <0.02 | 5 | <0.02 | Mo | <0.02 | Ŗ | <0.02 | Sm | <0.02 | s | <0.02 | Sn | <0.02 | Zn | <0.02 |
| B | <0.02 | 0° | <0.02 | Au | <0.02 | РЪ | <0.02 | Nd | <0.02 | K | Т | Sc | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |
| | | | | | | | | | 3 | | | | | | | | | | |

(I) = Target analyte

Physical Characterization:

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

In & All

Certified by:

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

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

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

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

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

Part # 57119 Lot # 103024

| Part # 58111 Lot # 072424 | m/z-> | N. Un M | m/z-> | א. ה ס | 5.0E6 | N 51 11 63 | 5.0E5 | 1. Sodium nitrate (Na) | Compound | Description: Expiration Date: Recommended Storage: Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa | CERTIFIED WEIGHT REPORT: Part Number: Lot Number: | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
|--------------------------------|---------|---------------|-----------------|--------------|--------------|---------------------|--------------------------------------|---------------------------|---|--|---|--|
| 424 | 210 220 | | 110 120 | | น ง ง | | [1] Spectrum No.1 | IN036 NAV01201511 1 | RM# Lot N | Sodium (Na 072427 Ambient (20 ° 10000 6UTB s diluted to (mL): | a a · | Inc. |
| | 230 240 | | 130 140 | | ల ర | | 8.935 sec]:58111.D# [Count] [Linear] | 10000 99.999 0.10 26.9 | Nominal Purity Uncertainty Assay Conc. (ug/mL) (%) Purity (%) (%) | レ WM ら 1 4 4 2% C) SE-05 Balance Uncertainty 4000.2 0.10 Flask Uncertainty | R-> 1/13/2_Solvent: | Certified Re |
| 1 of 2 | 250 260 | | 150 160 1 | | 50 60 | | unt] [Linear] | 148.7096 ###### 10000.0 | Target Actual Actual Weight (g) Weight (g) Conc. (µg/mL) | 80.0 Nitric Acid (mL) | Lot # 24002546 Nitric Acid | Certified Reference Material CRM |
| Printed: 1/10/2025, 4:48:22 PM | | | 170 180 190 200 | | 70 80 90 100 | | | 20.0 7631-99-4 5 mg/m3 or | Expanded SDS Information Uncertainty (Solvent Safety Info. On Attached pg.) .) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50 | Formulated By: Benson Chan | M | ANAB I AR-15: https://Ak |
| 22 PM | | | | | | | | orl-rat 3430 mg/kg 3152a | IChed pg.) NIST LDSO SRM | 072424 072424 | | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

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



Certified Reference Material CRM



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

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

| | <0.02 Cu <0.02 | <0.02 Co <0.02 | Be <0.01 Cr <0.02 Ga | <0.02 Cs <0.02 | <0.2 Cc <0.02 | <0.02 Ca <0.2 | <0.02 Cd <0.02 | ARREST AL STATISTICS OF STATISTICS OF | | |
|---|----------------|----------------|----------------------|----------------|---------------|---------------|----------------|--|----------|------|
| | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | O.N. SHITS LAN. | | |
| | Pb | La | Fe | ŀ | In | Ho | Hf | | | |
| | <0.02 | <0.02 | 40.2 | <0.02 | <0.02 | <0.02 | <0.02 | Notific II.A. | Irace Mo | |
| | Nd | Mo | Hg | Mn | Mg | Lu | E | | ietais | |
| Ì | 40.02 | <0.02 | <0.2 | <0.02 | <0.01 | <0.02 | <0.02 | | Verifica | |
| | × | Ŗ | ٩ | Pd | ^S | Nb | Ni | | cion i | |
| | <0.2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | OY ICP-N | 57 |
| | Sc | Sm | Ru | Rb | Rh | Re | Pr | Presenter of | 10 F | 10 / |
| | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | g/mL) | |
| | Ta | ŝ | Sr | Na | Ag | <u>s</u> | Se | 1001 | | |
| | <0.02 | <0.02 | <0.02 | Т | <0.02 | <0.02 | <0.2 | and the set | | |
| | 13 | Sn | Tm | Th | T | Te | 7 | | | |
| | 40.02 | 40.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | The second s | | |
| | Zr | Zn | Y | Yb | < | U | W | | | |
| | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | | |

Physical Characterization:

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

In P. St.

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.

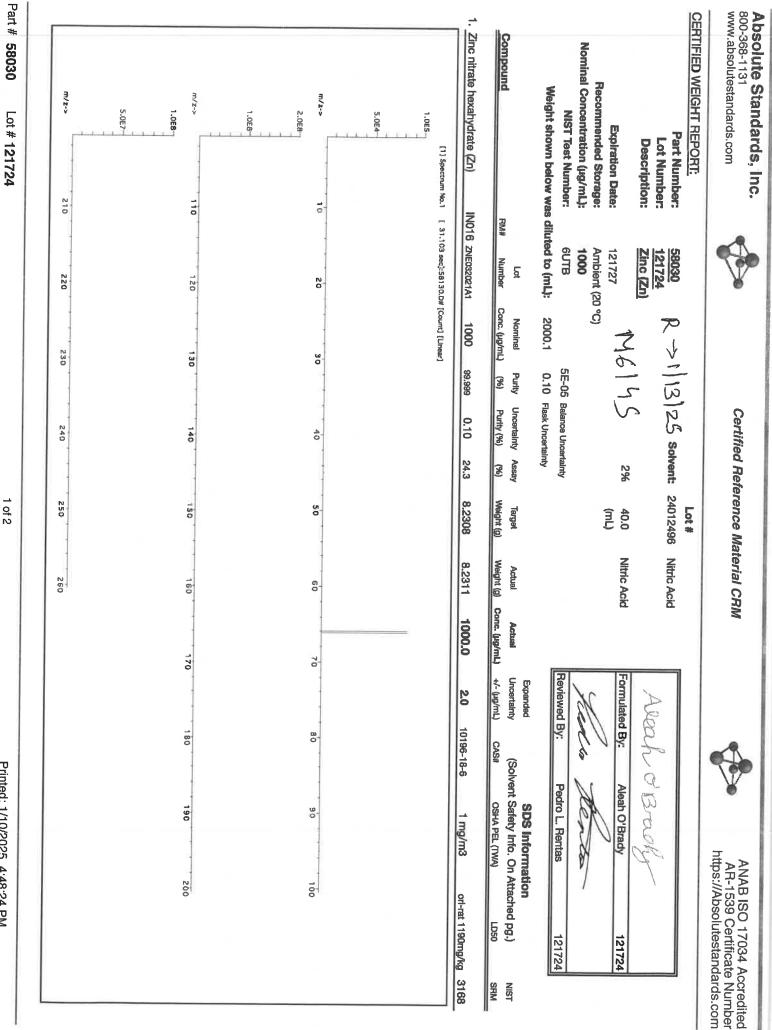
÷

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).



1 of 2

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|---------------------------|--------------|---------------------|
| | | Inc. |





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

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

| | | | | | | - | I race M | etais | Verifica | | by icr- | UNIC | /9/111L/ | L | | | | | |
|----|-------|----------------|-------|-----|-------|------|----------|-------|----------|---|---------|--------|----------|----|-------|-------|-------|----|-------|
| | | | | | | | | | | | | | | | 2 | 77 | 50.02 | W | SUG |
| A1 | cu u- | 1 64 1 | 20.02 | Dv | <0.02 | Hf | <0.02 | Li | 40.02 | Z | 40.02 | P | <0.02 | Se | 202 | 10 | 20.02 | W | 20.02 |
| 2 | 10.01 | 1 | | 1 | 5 | ŧ. | 3 | ; | 2 | Ş | 2002 | R P | <0.02 | 2 | <0.02 | Fe | <0.02 | C | <0.02 |
| S | 20.02 | C ₂ | 2.2 | CT. | 20.02 | DIU. | 10.02 | 5 | 1024 | | 10.01 | 1 | | | 2 | 1 | 50.00 | 4 | 33 |
| Å | < 0 > | ç | <0.02 | Fu | <0.02 | h | <0.02 | Mg | A0.01 | õ | <0.02 | Kh | 20.02 | Ag | 20.02 | 11 | 70.02 | | -0.01 |
| 1 | | | 5 | 2 | 5 | 7 | 333 | Š | 50.02 | Р | 40.02 | Rb | A0.02 | Na | 4012 | Th | <0.02 | ХP | 20.02 |
| Ba | 20.05 | Ç | 20.02 | 00 | 10.04 | ** | | | | | | , | 5 | ? | 500 | 1 | 33 | < | 30 |
| Re | -001 | R | <0.02 | ନ୍ମ | <0.02 | Fe | <0.2 | Hg | 40.2 | 7 | <0.02 | KU | <0.02 | 2 | 20.02 | L III | 10.01 | 3, | |
| 2 | 2 | 2 | 3 | 2 | 2000 | 5 | 300 | K | <0.02 | Ş | A.02 | Sm | A.02 | S | <0.02 | Sn | <0.02 | 20 | F |
| 10 | 20.02 | Ş | 10.02 | 00 | 10.00 | - | | | | | 5 | 2 | 2 | 7 | 33 | 1 | <0 03 | 77 | <0.02 |
| 80 | <0.02 | Q | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | К | 202 | 30 | 20.02 | 1a | 20.02 | | 10.04 | | |

(T) = Target analyte

Physical Characterization:

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

Ser R. She

Certified by:

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

the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

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

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

Part # 58030 Lot # 121724



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

16150

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

- APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.
 - **<u>CAUTION</u>**: Read instructions carefully before opening bottle(s) and proceeding with the analyses.

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

Safety Data Sheets Available Upon Request

(A) SAMPLE DESCRIPTION

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

ICV1-1014 For ICP-AES analysis, use a 10-fold dilution by pipetting 10 mL of the ICV1 concentrate into a 100 mL volumetric flask and dilute to volume with 2% (v/v) nitric acid.

RMs ICV 1, 5, 6 SFAM.docx

Page 1 of 2

QATS Form 20-007F188R00, 04-19-2021



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



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

| APTIM | 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) K ₂ Cr ₂ O ₇ 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 $K_3Fe(CN)_6$, Type II water, and 0.1 % sodium hydroxide, and will decompose rapidly if exposed to light. |

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

| | 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 | |

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

| | 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 |

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





M6151

R-> 1/15/25

Material No.: 9530-33 Batch No.: 22G2862015 Manufactured Date: 2022-06-15 Retest Date: 2027-06-14 Revision No.: 0

Certificate of Analysis

| Test | Specification | D. L. |
|---|---------------|-------------|
| ACS - Assay (as HCI) (by acid-base titrn) | | Result |
| ACS - Color (APHA) | 36.5 - 38.0 % | 37.9 % |
| ACS - Residue after Ignition | ≤ 10 | 5 |
| ACS - Specific Gravity at 60°/60°F | ≤ 3 ppm | < 1 ppm |
| ACS – Bromide (Br) | 1.185 - 1.192 | 1.191 |
| ACS - Extractable Organic Substances | ≤ 0.005 % | < 0.005 % |
| ACS – Free Chlorine (as Cl ₂) | ≤ 5 ppm | < 1 ppm |
| Phosphate (PO4) | ≤ 0.5 ppm | < 0.5 ppm |
| Sulfate (SO4) | ≤ 0.05 ppm | < 0.03 ppm |
| Sulfite (SO3) | ≤ 0.5 ppm | < 0.3 ppm |
| Ammonium (NH4) | ≤ 0.8 ppm | 0.3 ppm |
| Trace Impurities - Arsenic (As) | ≤ 3 ppm | < 1 ppm |
| Trace Impurities - Aluminum (Al) | ≤ 0.010 ppm | < 0.003 ppm |
| Arsenic and Antimony (as As) | ≤ 10.0 ppb | 1.3 ppb |
| Trace Impurities – Barium (Ba) | ≤ 5.0 ppb | < 3.0 ppb |
| | ≤ 1.0 ppb | 0.2 ppb |
| Trace Impurities – Beryllium (Be) | ≤ 1.0 ppb | < 0.2 ppb |
| Trace Impurities - Bismuth (Bi) | ≤ 10.0 ppb | < 1.0 ppb |
| Trace Impurities – Boron (B) | ≤ 20.0 ppb | < 5.0 ppb |
| Trace Impurities - Cadmium (Cd) | ≤ 1.0 ppb | < 0.3 ppb |
| Trace Impurities - Calcium (Ca) | ≤ 50.0 ppb | 163.0 ppb |
| Trace Impurities – Chromium (Cr) | ≤ 1.0 ppb | 0.7 ppb |
| Trace Impurities - Cobalt (Co) | ≤ 1.0 ppb | < 0.3 ppb |
| Trace Impurities – Copper (Cu) | ≤ 1.0 ppb | < 0.1 ppb |
| Trace Impurities - Gallium (Ga) | ≤ 1.0 ppb | < 0.2 ppb |
| Trace Impurities - Germanium (Ge) | ≤ 3.0 ppb | < 2.0 ppb |
| Trace Impurities – Gold (Au) | ≤ 4.0 ppb | 0.6 ppb |
| Heavy Metals (as Pb) | ≤ 100 ppb | < 50 ppb |
| Trace Impurities – Iron (Fe) | ≤ 15 ppb | 6 ppb |
| | | |

>>> Continued on page 2 >>>

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





Material No.: 9530-33 Batch No.: 22G2862015

| Test | Specification | Result |
|--|---------------|------------|
| Trace Impurities - Lead (Pb) | ≤ 1.0 ppb | < 0.5 ppb |
| Trace Impurities – Lithium (Li) | ≤ 1.0 ppb | < 0.2 ppb |
| Trace Impurities – Magnesium (Mg) | ≤ 10.0 ppb | 2.9 ppb |
| Trace Impurities – Manganese (Mn) | ≤ 1.0 ppb | < 0.4 ppb |
| Trace Impurities – Mercury (Hg) | ≤ 0.5 ppb | 0.1 ppb |
| Trace Impurities – Molybdenum (Mo) | ≤ 10.0 ppb | < 3.0 ppb |
| Trace Impurities – Nickel (Ni) | ≤ 4.0 ppb | < 0.3 ppb |
| Trace Impurities – Niobium (Nb) | ≤ 1.0 ppb | 0.8 ppb |
| Trace Impurities – Potassium (K) | ≤ 9.0 ppb | < 2.0 ppb |
| Trace Impurities – Selenium (Se), For Information Only | | < 1.0 ppb |
| Trace Impurities - Silicon (Si) | ≤ 100.0 ppb | < 10.0 ppb |
| Trace Impurities - Silver (Ag) | ≤ 1.0 ppb | 0.5 ppb |
| Trace Impurities – Sodium (Na) | ≤ 100.0 ppb | 2.3 ppb |
| Trace Impurities – Strontium (Sr) | ≤ 1.0 ppb | < 0.2 ppb |
| Trace Impurities – Tantalum (Ta) | ≤ 1.0 ppb | 1.6 ppb |
| Trace Impurities – Thallium (TI) | ≤ 5.0 ppb | < 2.0 ppb |
| Trace Impurities – Tin (Sn) | ≤ 5.0 ppb | 4.0 ppb |
| Trace Impurities – Titanium (Ti) | ≤ 1.0 ppb | 1.5 ppb |
| Trace Impurities – Vanadium (V) | ≤ 1.0 ppb | < 0.2 ppb |
| Trace Impurities – Zinc (Zn) | ≤ 5.0 ppb | 0.8 ppb |
| Trace Impurities – Zirconium (Zr) | ≤ 1.0 ppb | 0.3 ppb |
| | | - FFF |

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





Material No.: 9530-33 Batch No.: 22G2862015

| Test | Specification | Result |
|------|---------------|--------|
| | | |

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

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



Vice President Global Quality

Nitric Acid 69% CMOS





R-0210212025

M-6158

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

>>> Continued on page 2 >>>

Wavantor^{**}



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

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

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

Junie Croak Director Quality Operations, Bioscience Production

| N 55 10 0 | m/z-> 110 5.0E6 | រា .0 ៣ ភា | m/≥-> 10 | ហ .0 ព | [1] Spectrum No.1 1.0E7 | 1. Silver nitrate (Ag) | Compound | Part Number: 57047 Lot Number: 122823 Description: Silver (A Description: Silver (A Expiration Date: 122826 Recommended Storage: Ambient (; Nominal Concentration (µg/mL): 1000 NIST Test Number: 6UTB Weight shown below was diluted to (mL): | Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com CERTIFIED WEIGHT REPORT: |
|--------------------|--------------------|---------------------|----------|--------------|---------------------------------------|------------------------|--|--|---|
| | 120 | | N. | | - | 5 J0612AGA1 | Lot Nor RM# Number Conc. (| 57047 122823 Silver (Ag) 122826 Ambient (20 Ambient (20 1000 6UTB 6UTB | * |
| | 130 140 | | 90 40 | | 14.044 sec]:58147.D# [Count] [Linear] | 88.8988 0.10 | Nominal Purity Uncertainty Assay Conc. (Jug/mL) (96) Purity (96) (96) | *C) 5E-05 Balance Uncertainty | Certified I R 1 8 5 2 4 |
| | 1 ភូ- O | | 50 | | [Count] [Linear] | 6.27992 | Target Weight (g) | n t: 24002546 2% 80.0 (mL) | Certified Reference Material |
| | 160 170 | | 60 70 | | | 1000.0 | Actual Actual U Weight (g) Conc. (µg/mL) + | Nitric Acid | rial CRM M6030 |
| | 180 | | 80 | | | 2.0 7761-88-8 | Expanded Uncertainty (Solv +/- (µg/mL) CAS# | ad By: |)30 |
| | 190 200 | | 90 100 | | | 10 ug/m3 | SDS Information (Solvent Safety Info. On Attached pg.) # OSHA PEL (TWA) LD51 | Benson Chan Pedro L. Rentas | http |
| | ŏ | | ŏ | | | | n ached pg.) NIST LD50 SRM | 122823 | ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com |

Part # 57047 Lot # 122823

1 of 2

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≤ ∞





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

| | | | | | | | | -lecais | VCITICA | | by ICFT | SIC 1 | hailer | | | | | | |
|----|--------------|---|---------------|----------|--------------------|----------|------------|----------------------|---------|-----|------------------------|-------|-----------------------|----------|-------|-----|--------------|----|-------|
| | | | The shares of | A COLUMN | Contraction of the | State of | UNIX 2 COL | 18 - ¹ 14 | | 100 | The state of the state | | 1.40 . 10 . 10 . 10 E | No. | | No. | | | |
| A | <0.02 | 8 | <0.02 | Dy | <0.02 | Hf | <0.02 | 5 | <0.02 | N | <0.02 | 7 | <0.02 | Se | <0.2 | ТЪ | <0.02 | W | <0.02 |
| Sb | <0.02 | ß | <0.2 | 막 | 40.02 | Но | <0.02 | Lu | <0.02 | ĥ | <0.02 | Re | <0.02 | <u>8</u> | <0.02 | Te | 40.02 | q | <0.02 |
| As | 4 0.2 | ĉ | <0.02 | 땹 | <0.02 | h | <0.02 | Mg | <0.01 | õ | <0.02 | Rh | <0.02 | Ag | T | 1 | <0.02 | < | <0.02 |
| Ba | <0.02 | S | <0.02 | ନ୍ଥ | <0.02 | Ħ | <0.02 | Mn | <0.02 | Pd | <0.02 | Rb | <0.02 | Na | <0.2 | Ţ | <0.02 | YЪ | <0.02 |
| Be | <0.01 | Ω | <0.02 | ଦ୍ଧ | <0.02 | Fe | <0.2 | Hg | 40.2 | p | <0.02 | Ru | <0.02 | ş | <0.02 | Tm | <0.02 | × | <0.02 |
| B | <0.02 | S | <0.02 | ନ୍ନ | <0.02 | L | <0.02 | Mo | <0.02 | Ŗ | <0.02 | Sm | <0.02 | Ś | <0.02 | Sh | <0.02 | 2 | <0.02 |
| μ. | <0.02 | ß | <0.02 | Au | <0.02 | Pb | <0.02 | Nd | <0.02 | K | 40 2 | Ş | <0.02 | Ta | <0.02 | Ð | <0.02 | 2 | <0.02 |

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

Physical Characterization:

(T)= Target analyte

Certified by:

In & She

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

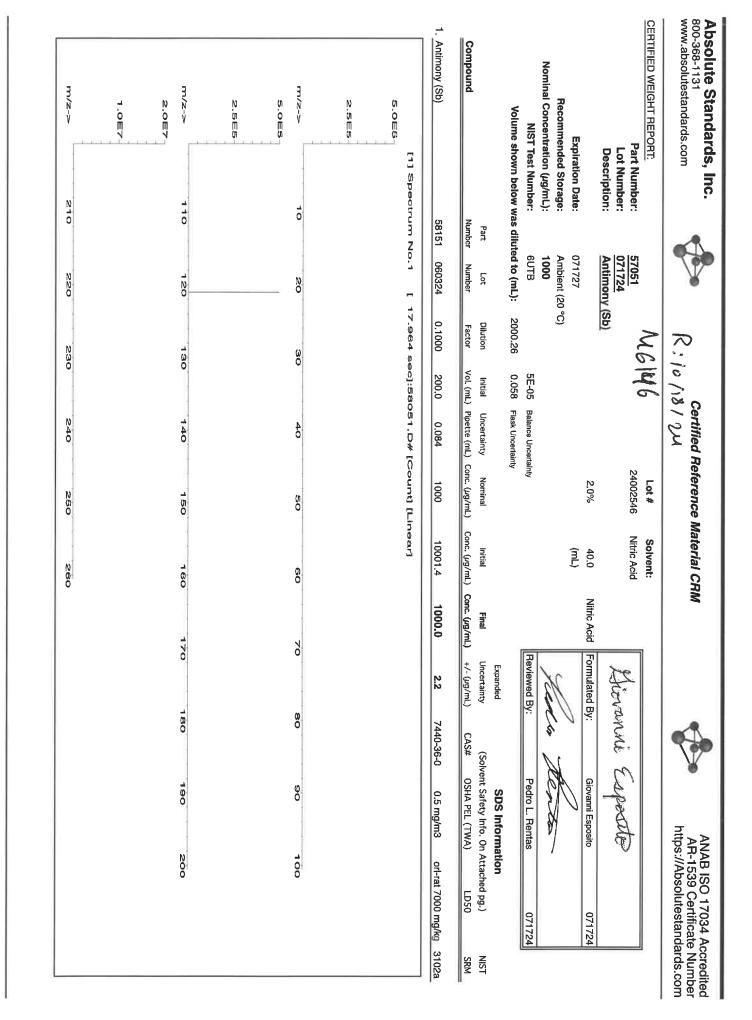
the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

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

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

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



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



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):

| | _ | | | | SP | | | |
|--------|-------|-------|-------|--------|-------|-------|----------|--|
| | | | | | T | | | |
| Ω Ω | ŝ | ç | ŝ | ů | Ca | Q | | |
| <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.2 | <0.02 | | |
| Au | ନ୍ଚ | Ga | ଜ | En | Ę | Dy | | |
| <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | |
| Pb | La | Fe | ŀ | μ | Ho | Hf | | |
| <0.02 | <0.02 | <0.2 | <0.02 | <0.02 | <0.02 | <0.02 | Irace M | |
| Nd | Mo | Hg | Mn | Mg | Lu | Ľ | letais | |
| <0.02 | <0.02 | <0.2 | <0.02 | < 0.01 | <0.02 | <0.02 | Verifica | |
| K | Pt | P | Pd | °s | ĥ | Ni | tion | |
| <0.2 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | by ICP-N | |
| Sc | Sm | Ru | Rb | Rh | Re | P | in) SI | |
| <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | g/mL) | |
| Ta | s | Sr | Na | Ag | Si | Se | | |
| <0.02 | <0.02 | <0.02 | <0.2 | <0.02 | <0.02 | <0.2 | | |
| T | Sn | Tm | Τħ | T | Te | Τb | | |
| <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | | |
| Zr | Zn | Y | Υь | V | Ч | W | | |
| <0.02 | <0.02 | <0.02 | <0.02 | <0,02 | <0.02 | <0.02 | | |

(T) = Target analyte

Physical Characterization:

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

Son P. Mar

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).

M6152



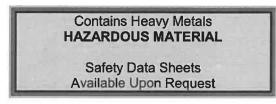
QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-AES ICS

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

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

- APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.
 - **<u>CAUTION</u>**: Read instructions carefully before opening bottle(s) and proceeding with the analyses.



(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

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

Page 1 of 2

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



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



Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

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

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

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

| | | | | | | | ALC: NOT THE OWNER OF THE OWNER OWNER OF THE OWNER OWNE OWNER OWNE |
|---------|------|------------------|------------------------|-------------------------|-----------------------------|------------------------|--|
| Element | CRQL | Part A (µg/L) | Low Limit (µg/L) | High Limit (µg/L) | Part A +Part B (µg/L) | Low Limit (µg/L) | High Limit (µg/L) |
| Al | 200 | 255000 | 216000 | 294000 | 247000 | 209000 | 285000 |
| Sb | 60 | (0.0) | -60.0 | 60.0 | 618 | 525 | 711 |
| As | 10 | (0.0) | -10.0 | 10.0 | 104 | 88.4 | 120 |
| Ва | 200 | (6.0) | -194 | 206 | (537) | 337 | 737 |
| Be | 5.0 | (0.0) | -5.0 | 5.0 | 495 | 420 | 570 |
| Cd | 5.0 | (1.0) | -4.0 | 6.0 | 972 | 826 | 1120 |
| Са | 5000 | 245000 | 208000 | 282000 | 235000 | 199000 | 271000 |
| Cr | 10 | (52.0) | 42.0 | 62.0 | 542 | 460 | 624 |
| Со | 50 | (0.0) | -50.0 | 50.0 | 476 | 404 | 548 |
| Cu | 25 | (2.0) | -23.0 | 27.0 | 511 | 434 | 588 |
| Fe | 100 | 101000 | 85600 | 116500 | 99300 | 84400 | 114500 |
| Pb | 10 | (0.0) | -10.0 | 10.0 | (49.0) | 39.0 | 59.0 |
| Mg | 5000 | 255000 | 216000 | 294000 | 248000 | 210000 | 286000 |
| Mn | 15 | (7.0) | -8.0 | 22.0 | 507 | 430 | 584 |
| Ni | 40 | (2.0) | -38.0 | 42.0 | 954 | 810 | 1100 |
| Se | 35 | (0.0) | -35.0 | 35.0 | (46.0) | 11.0 | 81.0 |
| Ag | 10 | (0.0) | -10.0 | 10.0 | 201 | 170 | 232 |
| TI | 25 | (0.0) | -25.0 | 25.0 | (108) | 83.0 | 133 |
| V | 50 | (0.0) | -50.0 | 50.0 | 491 | 417 | 565 |
| Zn | 60 | (0.0) | -60.0 | 60.0 | 952 | 809 | 1095 |

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



Instructions for QATS Reference Material: ICP-AES ICS

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

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

- APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.
 - CAUTION: Read instructions carefully before opening bottle(s) and proceeding with the analyses.

Contains Heavy Metals HAZARDOUS MATERIAL Safety Data Sheets

Available Upon Request

M6155

(A) SAMPLE DESCRIPTION

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

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

(B) BREAKAGE OR MISSING ITEMS

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

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

(C) ANALYSIS OF SAMPLES

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

Page 1 of 2

RMICP-AES ICSA-1211 B-0710 SFAM.docx

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



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



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

Instructions for QATS Reference Material: ICP-AES ICS

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

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

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

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

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

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

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

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



Certificate of Analysis

R: 8/5/24 M6019

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--------------------------------------|
| Catalog Number: | CGSR1 |
| Lot Number: | U2-SR730227 |
| Matrix: | 0.1% (v/v) HNO3 |
| Value / Analyte(s): | 1 000 μg/mL ea: Strontium |
| Starting Material: | SrCO3 |
| Starting Material Lot#: | M2-2192 |
| Starting Material Purity: | 99.9993% |
| CERTIFIED VALUES AN | ID UNCERTAINTIES |

| Certified Value: | 1001 ± 3 µg/mL |
|------------------|--|
| Density: | 1.000 g/mL (measured at 20 \pm 4 °C) |

Assay Information:

3.0

| Assay Method #1 | 998 ± 4 μg/mL ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985 |
|-----------------|---|
| Assay Method #2 | 1001 ± 3 μg/mL EDTA NIST SRM 928 Lot Number: 928 |
| Assay Method #3 | 1001 ± 2 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2 |

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

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i ≃ mean of Assay Method i with standard uncertainty u_{char} i w_i = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_{i} = (1/u_{char\,i})^{2} / (\Sigma(1/(u_{char\,i})^{2})$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{cher} + u^2_{bb} + u^2_{lts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 $u_{cher} = [Z(w_i)^2 (u_{char} i)^2]$ ^{1/2} where u_{char} i are the errors from each characterization method u_{bb} = bottle to bottle homogeneity standard uncertainty

bb - boute to outer homogeneity sandard uncertainty utrs = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

 $X_{CRM/RM} = (X_n) (u_{char e})$ $X_n = mean of Assay Method A with$ $<math>u_{char a} =$ the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{char a} + u^2_{bb} + u^2_{tts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 uchar a = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty u_{its} = long term stability standard uncertainty (storage) u_{its} = transport stability standard uncertainty

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

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

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

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

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

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY 11.0

11.1 Certification Issue Date

March 03, 2023

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

11.2 Lot Expiration Date

- March 03, 2028

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

BD9784.

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director



Certificate of Analysis

R: 8/5/24 M6019

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

1.0 ACCREDITATION / REGISTRATION

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



2.0 PRODUCT DESCRIPTION

| Product Code: | Single Analyte Custom Grade Solution |
|---------------------------|--------------------------------------|
| Catalog Number: | CGSR1 |
| Lot Number: | U2-SR730227 |
| Matrix: | 0.1% (v/v) HNO3 |
| Value / Analyte(s): | 1 000 μg/mL ea: Strontium |
| Starting Material: | SrCO3 |
| Starting Material Lot#: | M2-2192 |
| Starting Material Purity: | 99.9993% |
| CERTIFIED VALUES AN | ID UNCERTAINTIES |

| Certified Value: | 1001 ± 3 µg/mL |
|------------------|--|
| Density: | 1.000 g/mL (measured at 20 \pm 4 °C) |

Assay Information:

3.0

| Assay Method #1 | 998 ± 4 μg/mL ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985 |
|-----------------|---|
| Assay Method #2 | 1001 ± 3 μg/mL EDTA NIST SRM 928 Lot Number: 928 |
| Assay Method #3 | 1001 ± 2 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2 |

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

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

Characterization of CRM/RM by Two or More Methods

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

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

- X_i ≃ mean of Assay Method i with standard uncertainty u_{char} i w_i = the weighting factors for each method calculated using the inverse square of the variance:
 - $w_{i} = (1/u_{char\,i})^{2} / (\Sigma(1/(u_{char\,i})^{2})$

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{cher} + u^2_{bb} + u^2_{lts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 $u_{cher} = [Z(w_i)^2 (u_{char} i)^2]$ ^{1/2} where u_{char} i are the errors from each characterization method u_{bb} = bottle to bottle homogeneity standard uncertainty

bb - boute to outer homogeneity sandard uncertainty utrs = long term stability standard uncertainty (storage) uts = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

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

 $X_{CRM/RM} = (X_n) (u_{char e})$ $X_n = mean of Assay Method A with$ $<math>u_{char a} =$ the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) = U_{CRM/RM} = k ($u^2_{char a} + u^2_{bb} + u^2_{tts} + u^2_{ts}$)^{1/2} k = coverage factor = 2 uchar a = the errors from characterization u_{bb} = bottle to bottle homogeneity standard uncertainty u_{its} = long term stability standard uncertainty (storage) u_{its} = transport stability standard uncertainty

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

4.1 Thermometer Calibration

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

4.2 Balance Calibration

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

4.3 Glassware Calibration

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

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

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

| м | Ag | < | 0.001980 | М | Eu | < | 0.000495 | 0 | Na | | 0.000200 | М | Se | < | 0.013862 | 0 | Zn | | 0.000143 |
|---|----|---|----------|---|----|---|----------|-----|----|---|----------|---|----|---|----------|---|----|---|----------|
| 0 | A | | 0.000370 | 0 | Fe | | 0.000410 | М | Nb | < | 0.000495 | i | Si | < | | М | Zr | < | 0.000495 |
| М | As | < | 0.000495 | М | Ga | < | 0.000495 | М | Nd | < | 0.000495 | М | Sm | < | 0.000495 | | | | |
| М | Au | < | 0.000989 | М | Gd | < | 0.000495 | 0 | Ni | < | 0.007631 | М | Sn | < | 0.000990 | | | | |
| М | в | < | 0.039606 | М | Ge | < | 0.000495 | М | Os | < | 0.000494 | s | Sr | < | | | | | |
| М | Ba | | 0.006486 | М | Hf | < | 0.000495 | i – | Р | < | | М | Та | < | 0.000495 | | | | |
| М | Be | < | 0.000990 | M | Hg | < | 0.000989 | М | Pb | < | 0.002970 | М | Tb | < | 0.000495 | | | | |
| М | Bi | < | 0.000495 | М | Но | < | 0.000495 | М | Pd | < | 0.003957 | М | Те | < | 0.027724 | | | | |
| 0 | Ca | | 0.004255 | М | In | < | 0.000495 | М | Pr | < | 0.000495 | M | Th | < | 0.000990 | | | | |
| М | Cd | | 0.001339 | Μ | lr | < | 0.000494 | М | Pt | < | 0.002970 | М | Ti | < | 0.005940 | | | | |
| М | Ce | < | 0.004950 | 0 | к | < | 0.008184 | М | Rb | < | 0.002970 | М | TI | < | 0.000495 | | | | |
| М | Со | < | 0.000495 | М | La | < | 0.000495 | М | Re | < | 0.000495 | М | Tm | < | 0.000495 | | | | |
| 0 | Cr | < | 0.003207 | 0 | Li | < | 0.000884 | 0 | Rh | < | 0.012829 | М | U | < | 0.001485 | | | | |
| М | Cs | < | 0.000990 | М | Lu | < | 0.002970 | М | Ru | < | 0.000989 | М | V | < | 0.001980 | | | | |
| М | Cu | | 0.000099 | 0 | Mg | | 0.000064 | i | s | < | | М | W | < | 0.003960 | | | | |
| М | Dy | < | 0.000495 | 0 | Mn | | 0.000066 | М | Sb | < | 0.014852 | 0 | Y | < | 0.000995 | | | | |
| М | Er | < | 0.000495 | М | Мо | < | 0.001980 | М | Sc | < | 0.001980 | М | Yb | < | 0.000495 | | | | |
| | | | | | | | | | | | | | | | | | | | |

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

6.0 INTENDED USE

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

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

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

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

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

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

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

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

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

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

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

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

8.0 HAZARDOUS INFORMATION

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

9.0 HOMOGENEITY

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY 11.0

11.1 Certification Issue Date

March 03, 2023

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

11.2 Lot Expiration Date

- March 03, 2028

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

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

11.3 Period of Validity

- Sealed TCT Bag Open Date:

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

NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Approved By:

Thomas Kozikowski Manager, Quality Control

BD9784.

Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

| 800-368-1131 www.absolutestandards.com | CERTIFIED WEIGHT REPORT: | Par Loi De | Expiration Date: Recommended Storage: | NIST Tex | Weight showr | | Compound | | N. O | 1.000 | m/z-> | 1.0E4 | 5 0 0 | m/z->- | 1.0世8 | 5. 0 8 | ITVZ-> |
|--|--------------------------|---|--|---------------------------|---|---|--------------------------|---------------------------------------|------|-------|---------|-------|-------------|--------|-------|--------------|--------|
| | E | Part Number: Lot Number: Description: | Expiration Date: nended Storage: | NIST Test Number: | Weight shown below was diluted to (mL): | | VIMH. | [1] Spectrum No.1 | | | 10 | | | 110 | | | 012 |
| | | <u>57081</u> 062724 Thalllum (TI) | 062727 Ambient (20 °C) | 6UTB | ed to (mL): | Lot | Number | - | | | N | | | 120 | | | 220 |
| | | | °C) | 58 | 2000.1 0 | Nominal Pi | Conc. (J/g/mL) | 14.044 sec | | | a O | | | 130 | | | 230 |
| Certified Refi R ! 8]5]24 | | Š | | 5E-05 Balance Uncertainty | 0.10 Flask Uncertainty | Purity Uncertainty Assay | (%) PUTTY (%) | 14.044 sec]:57081.D# [Count] [Linear] | | | 4. 0 | | | 140 | | | 240 |
| Certified Reference Material CRM とという | | Solvent: 2400 | 2% 40 (m | pertainty | ainty | y Assay Target | (%) Weight (g) | ₩ [Count] [Li | | | 01 | | | 150 | | | 250 |
| e Material | | 24002546 Nitric Acid | 40.0 Nitric Acid (mL) | | | get Actual | | [Linear] | | | | | | | | | |
| СRМ М6023 | | Acid | cid | | | Actual | Weight (g) Conc. (µg/mL) | | | | 8 | | | 160 | | | 260 |
| 23 | | Alea | Formulated By: | Reviewed By: | | Expanded Uncertainty | L) +/- (µg/mL) | | | | 70 | | | 170 | | | |
| | | 20 | 8 | | | (Solvent | CAS# | | | | 80 | | | 180 | | | |
| http | | Grandly | Aleah O'Brady | Pedro L. Rentas | | SDS Information Safety Info. On Atta | OSHA PEL (TWA) | | | | 8 | | | 190 | | | |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | | | 062724 | 062724 | | SDS Information (Solvent Safety Info. On Attached pg.) | DSG1 | | | | 100 | | | 200 | | | |
| Accredite te Numbe dards.con | ٤ | | 4 | 4 | l | NIST | SKM | | | | | | | | | | |

Part # 57081 Lot # 062724

1 of 2

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| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com |
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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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(I) = Target analyte

Physical Characterization:

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

Ser P. S.

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 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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Part # 57081 Lot # 062724

| Absolute Standards, Inc. 800-368-1131 www.absolutestandards.com | CERTIFIED WEIGHT REPORT: | Part Number: 57023 Lot Number: 062424 Description: Vanadium (V) | Expiration Date: 062427 | | | Volume shown below was diluted to (mL): 2000.3 | Part Lot Dilution | Compound Number Number Factor | 1. Ammonium metavanadate (V) 58123 021224 0.1000 | [1] Spectrum No.1 [34.243 2.0E6 | | m/z->- 10 20 | 2.067 | 1.0巨7 | m/z 110 120 1 | 2.588 | |
|--|--------------------------|---|-------------------------|------|---------------------|--|--|-------------------------------|--|---------------------------------------|--|--------------|-------|-------|---------------|-------|------|
| 8:81 Ce | | | | | 5E-05 | 0.06 | Initial | | 200.0 | sec]:58 | | 30 | | | 190 | | 200 |
| Certified Reference Material CRM 冬」 シート | | | | | Balance Uncertainty | Flask Uncertainty | Uncertainty | | 0.084 | 34.243 sec]:58023.D# [Count] [Linear] | | 4 | | | 140 | | 240 |
| eference l | Lot # | 24002546 | 2,0% | | inty | | Nominal | Conc. (µg/mL) | 1000 | žount) [Lin | | 5 0 | | | - 50 | | 2000 |
| Naterial Cl | Solvent: | Nitric Acid | 40.0 (mL) | | | | Initial | Conc. (µg/mL) | 10000.3 | 1⊖ar] | | 60 | | | 160 | | 260 |
| MF M6021 | | | Nitric Acid | | | | Final | Con | 1000.0 | | | | | | j. | | • |
| 21 | | Alla | Formulated By: | M | Reviewed By: | | Expanded | | 2.2 | | | 70 | | | 170 | | |
| | | Alleah & Brack | J By: | 2 l | y: | | (Solve) | | 7803-55-6 | | | 80 | | | 180 0 | | |
| ht | | Garan | Aleah O'Brady | ento | Pedro L. Rentas | | SDS Information It Safety Info. On Atta | OSHA PEL (TWA) | 0.05 mg/m3 | | | 90 | | | 190 | | |
| ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com | | | 062424 | / | s 062424 | | SDS Information (Solvent Safety Info. On Attached pg.) | (A) LD50 | 3 ort-rat 58.1mg/kg | | | 100 | | | 200 | | |
| Accreditec te Numbe dards.con | 1 | | <u> </u> | | | ļ | NIST | SRM | 3165 | | | | | | | | |

1 of 2

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Part # 57023 Lot # 062424





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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| | <0.02 | 20.02 | 3 | 40.02 | 70.07 | 3 | - | 3 | 40.02 | 20.02 | Solution | A DESCRIPTION OF THE PARTY OF T | | | | |

Physical Characterization:

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

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Certified by:

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

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

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

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