

# Prep Standard - Chemical Standard Summary

| Order ID:<br>Test:                  | P2734<br>Metals CLP Full  |
|-------------------------------------|---|
| Prepbatch ID :<br>Sequence ID/Qc Ba | PB161459,<br>tch ID: LB131248,LB131291,   |
|                                     | MP80925,MP80926,MP80927,MP80928,MP80929,MP80930,MP80931,MP80932,MP80933,MP80934,<br>MP80944,MP80955,MP81115,MP81116,  |
|                                     |   |
|                                     |   |
| 289,M5294,M5296,N                   | 3,M4885,M4888,M4889,M4960,M4961,M5130,M5192,M5200,M5223,M5224,M5227,M5272,M5288,M5<br>//5298,M5389,M5395,M5429,M5473,M5494,M5498,M5513,M5632,M5658,M5697,M5698,M5735,M5754<br>99,M5800,M5801,M5815,M5817,M5818,M5819,M5875,M5895,M5915,M5925,M5931,W2606, |
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| <u>Recipe</u><br><u>ID</u><br>169 | NAME<br>1:1HNO3                   | <u>NO.</u><br>MP78706 | Prep Date<br>12/20/2023 | Expiration<br>Date<br>06/12/2024 |                | <u>ScaleID</u><br>METALS_SCA<br>LE_2 (M SC-2) |           |               |
|-----------------------------------|-----------------------------------|-----------------------|-------------------------|----------------------------------|----------------|---|-----------|---------------|
| FROM                              | 1250.00000ml of M5735 + 1250.0000 | 00ml of W26           | 606 = Final Q           | uantity: 2500.0                  | 00 ml          |   |           |               |
|                                   |                                   |                       |                         |                                  |                |   |           |               |
| Recipe<br>ID                      | NAME                              | <u>NO.</u>            | Prep Date               | Expiration<br>Date               | Prepared<br>By | <u>ScaleID</u>                                | PipettelD | Supervised By |

| Recipe |                                  |                |               | <b>Expiration</b> | Prepared        |                |           | Supervised By |
|--------|----------------------------------|----------------|---------------|-------------------|-----------------|----------------|-----------|---------------|
| ID     | NAME                             | <u>NO.</u>     | Prep Date     | <u>Date</u>       | <u>By</u>       | <u>ScaleID</u> | PipettelD | Mohan Bera    |
| 902    | ICP AES CAL BLK ( SO/ICB/CCB)    | <u>MP80924</u> | 05/30/2024    | 06/30/2024        | Sarabjit Jaswal | None           | None      |               |
|        |                                  |                |               |                   |                 |                |           | 06/11/2024    |
| FROM   | 125.00000ml of M5895 + 2350.0000 | 0ml of W260    | )6 + 25.00000 | ml of M5915 =     | Final Quantity: | 2500.000 ml    |           |               |
|        |                                  |                |               |                   |                 |                |           |               |
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| Recipe<br>ID<br>1004 | NAME<br>ICPAES ISM01.2 (S5)  | <u>NO.</u><br>MP80925                   | Prep Date<br>05/30/2024                               |  | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal     | <u>ScaleID</u><br>None          | <u>PipetteID</u><br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|----------------------|--|---|---|--|---|---------------------------------|--|---|
| FROM                 | 0.25000ml of M5798 + 0.50000ml of<br>12.50000ml of M5200 + 12.50000ml<br>14.50000ml of M5289 + 14.50000ml<br>22.50000ml of M5769 + 5.00000ml o<br>5.00000ml of M5875 + 318.50000ml | of M5288 +<br>of M5298 +<br>f M5272 + 5 | 12.50000ml of No.000000000000000000000000000000000000 | of M5698 + 12.9<br>of M5658 + 2.00<br>M5296 + 5.0000 | 50000ml of M58<br>0000ml of M551<br>00ml of M5395 + | 19 + 13.75000r<br>3 + 22.50000m | ml of M5697 +<br>l of M5498 +                |   |

| <u>Recipe</u><br><u>ID</u><br>1005 | NAME<br>ICPAES ISM01.2(S4)       | <u>NO.</u><br>MP80926 | <u>Prep Date</u><br>05/30/2024 |                 | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipettelD</u>         | <u>Supervised By</u><br>Mohan Bera |
|------------------------------------|----------------------------------|-----------------------|--------------------------------|-----------------|---|------------------------|--------------------------|------------------------------------|
| 1005                               | ICFALS ISM01.2(34)               | <u>IVIF 00920</u>     | 05/50/2024                     | 00/30/2024      | Salabjit Jaswal                                 | None                   | METALS_PIPE<br>TTE_3 (A) | 06/11/2024                         |
| FROM                               | 50.00000ml of MP80924 + 50.00000 | ml of MP809           | 925 = Final Q                  | uantity: 100.00 | 0 ml  |                        |                          |                                    |
|                                    |                                  |                       |                                |                 |   |                        |                          |                                    |
|                                    |                                  |                       |                                |                 |   |                        |                          |                                    |
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| <u>Recipe</u><br><u>ID</u><br>1007 | NAME<br>ICPAES ISM01.2(S3)       | <u>NO.</u><br>MP80927 | Prep Date<br>05/30/2024 |                 | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipetteID</u><br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|------------------------------------|----------------------------------|-----------------------|-------------------------|-----------------|---|------------------------|--|---|
| <u>FROM</u>                        | 25.00000ml of MP80925 + 75.00000 | ml of MP809           | 924  = Final Q          | uantity: 100.00 | 1 I I I I I I I I I I I I I I I I I I I         |                        |  |   |
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| <u>Recipe</u><br><u>ID</u> | NAME                             | <u>NO.</u>        | Prep Date     | Expiration<br>Date | <u>Prepared</u><br><u>By</u> | <u>ScaleID</u> | <u>PipetteID</u>         | Supervised By |
|----------------------------|----------------------------------|-------------------|---------------|--------------------|------------------------------|----------------|--------------------------|---------------|
| <u></u><br>1008            | ICPAES ISM01.2(S2)               | <u>MP80928</u>    | 05/30/2024    |                    | <u> </u>                     |                |                          | Mohan Bera    |
| 1000                       | 10FAL3 131001.2(32)              | <u>IVIF 00920</u> | 03/30/2024    | 00/30/2024         | Salabjit Jaswal              | None           | METALS_PIPE<br>TTE_3 (A) | 06/11/2024    |
| FROM                       | 12.50000ml of MP80925 + 87.50000 | ml of MP809       | 924 = Final Q | uantity: 100.00    | <br>10 ml                    |                | · ·                      |               |
|                            |                                  |                   |               | ,                  |                              |                |                          |               |
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| <u>Recipe</u><br><u>ID</u><br>994 | NAME<br>ICPAES ISM01.2 S1 (CONC.)  | <u>NO.</u><br>MP80929  | Prep Date<br>05/30/2024  | <u>Expiration</u><br><u>Date</u><br>06/22/2024                       | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal                       | <u>ScaleID</u><br>None   | PipettelD<br>METALS_PIPE<br>TTE_3 (A)      | Supervised By<br>Mohan Bera<br>06/11/2024 |
|-----------------------------------|--|--|--|--|---|--|--|---|
| FROM                              | 0.02000ml of M5815 + 0.03000ml of<br>0.20000ml of M4881 + 0.20000ml of<br>0.20000ml of M5658 + 0.20000ml of<br>0.50000ml of M4889 + 0.50000ml of<br>1.00000ml of M5800 + 1.20000ml of<br>10.00000ml of M5498 + 10.00000ml<br>34.41000ml of MP80924 = Final Qua | M4885 + 0.<br>M5801 + 0.<br>M5697 + 0.<br>M5224 + 1.<br>of M5769 + | 20000ml of M<br>20000ml of M<br>70000ml of M<br>20000ml of M<br>10.00000ml o | 5192 + 0.20000<br>5817 + 0.30000<br>4883 + 0.80000<br>5819 + 10.0000 | 0ml of M5298 +<br>0ml of M5698 +<br>0ml of M5494 +<br>00ml of M5200 + | 0.20000ml of N<br>0.40000ml of N<br>1.00000ml of N<br>+ 10.00000ml o | 15473 +<br>15289 +<br>15227 +<br>f M5288 + |   |

| <u>Recipe</u><br><u>ID</u><br>1003 | NAME<br>ICPAES ISM01.2 S1             | <u>NO.</u><br>MP80930 | <u>Prep Date</u><br>05/30/2024 |                      | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | PipettelD<br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|------------------------------------|---------------------------------------|-----------------------|--------------------------------|----------------------|---|------------------------|---------------------------------------|---|
| FROM                               | l<br>0.50000ml of MP80929 + 99.50000m | l<br>nl of MP8092     | I<br>24  = Final Qu            | l<br>antity: 100.000 | l l   |                        | 11L_3 (A)                             | 00/11/2024                                |
|                                    |                                       |                       |                                |                      |   |                        |                                       |   |
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| <u>Recipe</u><br><u>ID</u><br>2054 | NAME<br>ICV-ICPAES               | <u>NO.</u><br>MP80931 | Prep Date<br>05/30/2024 |                | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipetteID</u><br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|------------------------------------|----------------------------------|-----------------------|-------------------------|----------------|---|------------------------|--|---|
| FROM                               | 10.00000ml of M5294 + 90.00000ml | of MP80924            | ⊧ = Final Qua           | ntity: 100.000 | nl  |                        |  |   |
|                                    |                                  |                       |                         |                |   |                        |  |   |

| <u>Recipe</u><br><u>ID</u><br>904 | NAME<br>ICP AES ICSA SOLN        | <u>NO.</u><br>MP80932 | <u>Prep Date</u><br>05/30/2024 |                | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipetteID</u><br>METALS_PIPE | <u>Supervised By</u><br>Mohan Bera |
|-----------------------------------|----------------------------------|-----------------------|--------------------------------|----------------|---|------------------------|---------------------------------|------------------------------------|
|                                   |                                  |                       |                                |                |   |                        | TTE_3 (A)                       | 06/11/2024                         |
| FROM                              | 10.00000ml of M5130 + 90.00000ml | of MP80924            | Final Qua                      | ntity: 100.000 | ml  |                        |                                 |                                    |
|                                   |                                  |                       |                                |                |   |                        |                                 |                                    |
|                                   |                                  |                       |                                |                |   |                        |                                 |                                    |
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| <u>Recipe</u><br><u>ID</u><br>905 | NAME<br>ICP AES ICSAB SOLN       | <u>NO.</u><br>MP80933 | Prep Date<br>05/30/2024 |              | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipetteID</u><br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|-----------------------------------|----------------------------------|-----------------------|-------------------------|--------------|---|------------------------|--|---|
| <u>FROM</u>                       | 10.00000ml of M5130 + 10.00000ml | of M5223 +            | 80.00000ml c            | of MP80924 = | Final Quantity: 1                               | 00.000 ml              |  |   |
|                                   |                                  |                       |                         |              |   |                        |  |   |
|                                   |                                  |                       |                         |              |   |                        |  |   |
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| <u>Recipe</u><br><u>ID</u> | NAME   | <u>NO.</u>     | <u>Prep Date</u> | Expiration<br>Date | <u>Prepared</u><br><u>By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u><br>Mohan Bera |
|----------------------------|--|----------------|------------------|--------------------|------------------------------|----------------|------------------|------------------------------------|
| 1119                       | ICPAES ISM01.2(CCV)  | <u>MP80934</u> | 05/30/2024       | 06/30/2024         | Sarabjit Jaswal              | None           | METALS_PIPE      |                                    |
|                            |  |                |                  |                    |                              |                | TTE_3 (A)        | 06/11/2024                         |
| FROM                       | 12.25000ml of M5289 + 12.50000ml<br>125.00000ml of MP80925 + 322.750 |                |                  |                    |                              | 8 + 7.50000ml  | of M5769 +       |                                    |
|                            |  |                |                  |                    |                              |                |                  |                                    |



| Recipe<br>ID<br>2480 | NAME<br>ICP AES STD 6 ISM01.3  | <u>NO.</u><br>MP80935 | Prep Date<br>05/30/2024 |               | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | PipettelD<br>METALS_PIPE<br>TTE_3 (A) | Supervised By<br>Mohan Bera<br>06/11/2024 |
|----------------------|--|-----------------------|-------------------------|---------------|---|------------------------|---------------------------------------|---|
| FROM                 | 8.00000ml of M5200 + 8.00000ml of<br>60.00000ml of MP80924 = Final Qua |                       |                         | 5298 + 8.0000 | 0ml of M5498 +                                  | 8.00000ml of M         | 15769 +                               |   |

| <u>Recipe</u><br><u>ID</u><br>919 | NAME<br>ICP AES INTERNAL STD            | <u>NO.</u><br>MP80942 | <u>Prep Date</u><br>05/30/2024 | Expiration<br>Date<br>06/25/2024 | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | PipettelD<br>None | Supervised By<br>Mohan Bera<br>06/11/2024 |
|-----------------------------------|---|-----------------------|--------------------------------|----------------------------------|---|------------------------|-------------------|---|
| FROM                              | 1.00000ml of M4961 + 10.00000ml o<br>ml | I<br>f M4960 + 1      | ı<br>969.00000ml               | of W2606 + 20                    | 11<br>).00000ml of M5                           | 915  = Final Qu        | antity: 2000.00   |   |
|                                   |   |                       |                                |                                  |   |                        |                   |   |
|                                   |   |                       |                                |                                  |   |                        |                   |   |
|                                   |   |                       |                                |                                  |   |                        |                   |   |
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|                                   |   |                       |                                |                                  |   |                        |                   |   |



| <u>Recipe</u><br><u>ID</u><br>903 | NAME<br>ICP AES RINSE SOLN       | <u>NO.</u><br>MP80944 | <u>Prep Date</u><br>05/30/2024 |                 | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | PipetteID<br>None | Supervised By<br>Mohan Bera<br>06/11/2024 |
|-----------------------------------|----------------------------------|-----------------------|--------------------------------|-----------------|---|------------------------|-------------------|---|
| <u>FROM</u>                       | 200.00000ml of M5915 + 9800.0000 | Dml of W260           | )6  = Final Qu                 | antity: 10000.0 | 00 ml   |                        |                   |   |
|                                   |                                  |                       |                                |                 |   |                        |                   |   |
|                                   |                                  |                       |                                |                 |   |                        |                   |   |
|                                   |                                  |                       |                                |                 |   |                        |                   |   |

| <u>Recipe</u> |                                   |                |              | Expiration  | Prepared          |                |             | Supervised By |
|---------------|-----------------------------------|----------------|--------------|-------------|-------------------|----------------|-------------|---------------|
| <u>ID</u>     | NAME                              | <u>NO.</u>     | Prep Date    | <u>Date</u> | <u>By</u>         | <u>ScaleID</u> | PipettelD   | Mohan Bera    |
| 921           | ICPAES SPIKE SOL#6                | <u>MP80955</u> | 05/30/2024   | 06/30/2024  | Sarabjit Jaswal   | None           | METALS_PIPE |               |
|               |                                   |                |              |             |                   |                | TTE_3 (A)   | 06/12/2024    |
| FROM          | 0.25000ml of M4883 + 50.00000ml o | f M5754 + 4    | 9.75000ml of | MP80924 = F | inal Quantity: 10 | 0.000 ml       |             |               |
|               |                                   |                |              |             |                   |                |             |               |
|               |                                   |                |              |             |                   |                |             |               |
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| <u>Recipe</u><br><u>ID</u><br>3811 | NAME<br>SE-10PPM                  | <u>NO.</u><br>MP81115 | Prep Date<br>06/17/2024 |               | <u>Prepared</u><br><u>By</u><br>Sarabjit Jaswal | <u>ScaleID</u><br>None | <u>PipetteID</u><br>None | Supervised By<br>Mohan Bera<br>06/21/2024 |
|------------------------------------|-----------------------------------|-----------------------|-------------------------|---------------|---|------------------------|--------------------------|---|
| FROM                               | 0.10000ml of M4883 + 9.90000ml of | MP80924 =             | Final Quantit           | ty: 10.000 ml | <u> </u>  |                        |                          |   |
|                                    |                                   |                       |                         |               |   |                        |                          |   |
|                                    |                                   |                       |                         |               |   |                        |                          |   |
|                                    |                                   |                       |                         |               |   |                        |                          |   |
|                                    |                                   |                       |                         |               |   |                        |                          |   |
| Recipe                             |                                   |                       |                         | Expiration    | Prenared  |                        |                          | Supervised By                             |

| <b>Recipe</b> |                                   |                |                | Expiration    | Prepared        |                |           | Supervised By |
|---------------|-----------------------------------|----------------|----------------|---------------|-----------------|----------------|-----------|---------------|
| <u>ID</u>     | NAME                              | <u>NO.</u>     | Prep Date      | <u>Date</u>   | <u>By</u>       | <u>ScaleID</u> | PipetteID | Mohan Bera    |
| 3816          | TL-10PPM                          | <u>MP81116</u> | 06/17/2024     | 06/30/2024    | Sarabjit Jaswal | None           | None      |               |
|               |                                   |                |                |               |                 |                |           | 06/21/2024    |
| FROM          | 0.10000ml of M4889 + 9.90000ml of | MP80924 =      | = Final Quanti | ty: 10.000 ml |                 |                |           |               |
|               |                                   |                |                |               |                 |                |           |               |
|               |                                   |                |                |               |                 |                |           |               |
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|               |                                   |                |                |               |                 |                |           |               |



Standards, Inc.

ml

# CHEMICAL RECEIPT LOG BOOK

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



Standards, Inc.

500 ml

jaswal

jaswal

# CHEMICAL RECEIPT LOG BOOK

| Supplier              | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic<br>Ventures | CGIN10-5 / INDIUM 1 x 500<br>ml | 100721 | 10/07/2024         | 10/09/2021 /<br>jaswal     | 10/08/2021 /<br>jaswal         | M4960             |
| Supplier              | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute              | 58139 / Y, 10000 PPM,           | 052521 | 06/25/2024         | 10/09/2021 /               | 01/25/2019 /                   | M4961             |

| Supplier | ItemCode / ItemName                 | Lot #     | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|----------|-------------------------------------|-----------|--------------------|----------------------------|--------------------------------|-------------------|
| EPA      | PART A / ICSA ( ICP )<br>STOCK SOLN | ICSA-1211 | 11/19/2024         | 05/20/2024 /<br>bin        | 04/20/2021 /<br>bin            | M5130             |

| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 57042 / Mo, 1000 PPM,<br>125 ml | 051722 | 05/17/2025         | 07/01/2022 /<br>bin        | 06/17/2022 /<br>jaswal         | M5192             |
|                             |                                 |        |                    |                            |                                |                   |

| Opened By           | Received Date /<br>Received By | Chemtech<br>Lot #         |
|---------------------|--------------------------------|---------------------------|
| 06/23/2022 /<br>bin | 10/05/2021 /<br>bin            | M5200                     |
|                     | 06/23/2022 /                   | 06/23/2022 / 10/05/2021 / |

| Supplier | ItemCode / ItemName                  | Lot #     | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|----------|--------------------------------------|-----------|--------------------|----------------------------|--------------------------------|-------------------|
| EPA      | PART B / ICSAB ( ICP )<br>STOCK SOLN | ICSB-0710 | 11/19/2024         | 05/20/2024 /<br>bin        | 04/20/2021 /<br>bin            | M5223             |
|          |                                      |           |                    |                            |                                |                   |



| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 57051 / Sb, 1000 PPM,<br>125 ml | 101521 | 10/15/2024         | 06/29/2022 /<br>bin        | 10/18/2021 /<br>bin            | M5224             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57023 / V, 1000 PPM, 125<br>ml  | 100121 | 10/01/2024         | 07/01/2022 /<br>bin        | 10/18/2021 /<br>bin            | M5227             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | / Antimony (Sb)                 | 051822 | 05/18/2025         | 05/10/2023 /<br>bin        | 08/24/2022 /<br>jaswal         | M5272             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 58119 / K, 10000 PPM, 500<br>ml | 071122 | 07/11/2025         | 09/01/2022 /<br>jaswal     | 07/21/2022 /<br>jaswal         | M5288             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|                             |                                 |        |                    |                            |                                |                   |

|                             |                                    |        | Date       | Орепец Бу              | Кесетуец Бу            | LOL#  |
|-----------------------------|------------------------------------|--------|------------|------------------------|------------------------|-------|
| Absolute<br>Standards, Inc. | 58113 / Aluminum (Al)<br>10,000PPM | 070622 | 07/06/2025 | 09/02/2022 /<br>jaswal | 07/12/2022 /<br>jaswal | M5289 |
|                             |                                    |        |            |                        | -                      |       |
|                             |                                    |        |            |                        |                        |       |

| Supplier | ItemCode / ItemName                   | Lot #    | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|----------|---------------------------------------|----------|--------------------|----------------------------|--------------------------------|-------------------|
| EPA      | ICV-1 / ICV (ICP/ICPMS)<br>STOCK SOLN | ICV-1014 | 01/01/2025         | 12/13/2023 /<br>bin        | 02/20/2020 /<br>bin            | M5294             |



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# CHEMICAL RECEIPT LOG BOOK

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| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|--|--------------|--------------------|----------------------------|--------------------------------|-------------------|
| Inorganic<br>Ventures       | Z9651Q /<br>CHEM-CLP-4/.25L                | S2-MEB711673 | 11/02/2026         | 09/19/2022 /<br>jaswal     | 08/20/2022 /<br>jaswal         | M5296             |
| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 58126 / Fe, 10000 PPM,<br>500 ml           | 020422       | 02/04/2025         | 05/02/2023 /<br>jaswal     | 06/15/2022 /<br>jaswal         | M5298             |
| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57056 / Ba, 1000 PPM,<br>125 ml            | 072122       | 07/21/2025         | 04/29/2024 /<br>kareem     | 09/18/2022 /<br>bin            | M5389             |
| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Inorganic<br>Ventures       | CLPP-CAL-3 / CLP CAL<br>SOLUTION #3, 125mL | T2-MEB714159 | 01/13/2027         | 01/30/2024 /<br>bin        | 09/19/2022 /<br>bin            | M5395             |
| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57103 / Li, 10000 PPM,<br>125 ml           | 070622       | 07/06/2025         | 01/30/2023 /<br>bin        | 01/26/2023 /<br>bin            | M5429             |
| Supplier                    | ItemCode / ItemName                        | Lot #        | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57138 / Sr, 10000 PPM,<br>125 ml           | 082922       | 08/29/2025         | 03/16/2023 /<br>jaswal     | 03/16/2023 /<br>jaswal         | M5473             |



| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 57028 / Ni, 1000 PPM, 125<br>ml | 011223 | 01/12/2026         | 01/20/2023 /<br>bin        | 01/19/2023 /<br>bin            | M5494             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration         | Date Opened /              | Received Date /                | Chemtech          |
| ••                          | hemoode / hemitanie             | L01 #  | Date               | Opened By                  | Received By                    | Lot #             |

| Supplier                    | ItemCode / ItemName              | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|----------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 57182 / Pb, 10000 PPM,<br>125 ml | 061522 | 06/15/2025         | 03/19/2023 /<br>bin        | 03/17/2023 /<br>bin            | M5513             |
|                             |                                  |        |                    |                            |                                |                   |

| Supplier                       | ItemCode / ItemName                    | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|--------------------------------|--|--------|--------------------|----------------------------|--------------------------------|-------------------|
| PCI Scientific<br>Supply, Inc. | 1403 / Hydrogen Peroxide,<br>30% 1 gal | 820803 | 08/31/2024         | 01/03/2024 /<br>bin        | 08/03/2022 /<br>Al-Terek       | M5632             |
|                                |  |        |                    |                            |                                |                   |

| Supplier                    | ItemCode / ItemName                       | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 58024 / Chromium, Cr, 500<br>ml, 1000 PPM | 060523 | 06/05/2026         | 08/28/2023 /<br>jaswal     | 08/25/2023 /<br>jaswal         | M5658             |
|                             |   |        |                    |                            |                                |                   |

| ItemCode / ItemName           | Lot #               | Expiration<br>Date         | Date Opened /<br>Opened By   | Received Date /<br>Received By  | Chemtech<br>Lot #  |
|-------------------------------|---------------------|----------------------------|--|---|--|
| 3029 / Cu, 1000 PPM,<br>00 ml | 102523              | 10/25/2026                 | 04/03/2024 /<br>jaswal   | 10/27/2023 /<br>jaswal  | M5697  |
|                               | 029 / Cu, 1000 PPM, | 029 / Cu, 1000 PPM, 102523 | ItemCode / ItemName         Lot #         Date           D29 / Cu, 1000 PPM,         102523         10/25/2026 | ItemCode / ItemName         Lot #         Date         Opened By           029 / Cu, 1000 PPM,         102523         10/25/2026         04/03/2024 / | ItemCode / ItemName         Lot #         Date         Opened By         Received By           029 / Cu, 1000 PPM,         102523         10/25/2026         04/03/2024 /         10/27/2023 / |



| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|--|------------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 58025 / Mn, 1000 PPM,<br>500 ml                            | 102623     | 10/26/2026         | 04/18/2024 /<br>jaswal     | 10/27/2023 /<br>jaswal         | M5698             |
| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Seidler Chemical            | BA-9598-34 / Nitric Acid,<br>Instra-Analyzed (cs/4x2.5L)   | 23G1262003 | 06/12/2024         | 12/19/2023 /<br>jaswal     | 06/26/2023 /<br>Al-Terek       | M5735             |
| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 52166 / ICP-AES Spike<br>sample water matrix (18<br>comp.) | 112823     | 11/28/2026         | 05/01/2024 /<br>jaswal     | 12/15/2023 /<br>jaswal         | M5754             |
| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 58112 / Mg, 10000 PPM,<br>500 ml                           | 091823     | 09/18/2026         | 05/24/2024 /<br>Jaswal     | 01/03/2024 /<br>bin            | M5769             |
| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57004 / Be, 1000 PPM,<br>125 ml                            | 102523     | 10/25/2026         | 02/09/2024 /<br>bin        | 02/09/2024 /<br>bin            | M5798             |
| Supplier                    | ItemCode / ItemName  | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57050 / Sn, 1000 PPM,<br>125 ml                            | 071123     | 07/11/2026         | 02/09/2024 /<br>bin        | 02/09/2024 /<br>bin            | M5799             |



| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 57027 / CO, 1000 PPM,<br>125 ml | 091923 | 09/19/2026         | 02/09/2024 /<br>bin        | 02/09/2024 /<br>bin            | M5800             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57033 / As, 1000 PPM,<br>125 ml | 111323 | 11/13/2026         | 02/09/2024 /<br>bin        | 02/09/2024 /<br>bin            | M5801             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57115 / P, 10000 PPM, 125<br>ml | 041723 | 04/17/2026         | 05/21/2024 /<br>Jaswal     | 02/09/2024 /<br>jaswal         | M5815             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57116 / S, 10000 PPM, 125<br>ml | 071123 | 07/11/2026         | 03/01/2024 /<br>jaswal     | 02/09/2024 /<br>jaswal         | M5817             |
| Supplier                    | ItemCode / ItemName             | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Absolute<br>Standards, Inc. | 57014 / Si, 1000 PPM, 125<br>ml | 122023 | 12/20/2026         | 03/06/2024 /<br>jaswal     | 02/09/2024 /<br>jaswal         | M5818             |

| Supplier                    | ItemCode / ItemName                   | Lot #  | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------------|---------------------------------------|--------|--------------------|----------------------------|--------------------------------|-------------------|
| Absolute<br>Standards, Inc. | 58030 / Zinc, Zn, 500 ml,<br>1000 PPM | 111623 | 11/16/2026         | 03/20/2024 /<br>jaswal     | 02/09/2024 /<br>jaswal         | M5819             |
|                             |                                       |        |                    |                            |                                |                   |



| Supplier              | ItemCode / ItemName   | Lot #        | Expiration<br>Date     | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|-----------------------|---|--------------|------------------------|----------------------------|--------------------------------|-------------------|
| Inorganic<br>Ventures | CLPP-CAL-1 / CLP CAL<br>SOLUTION #1, 125mL                        | T2-MEB714417 | 01/27/2027             | 04/19/2024 /<br>jaswal     | 02/22/2024 /<br>jaswal         | M5875             |
| Supplier              | ItemCode / ItemName   | Lot #        | Expiration<br>Date     | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Seidler Chemical      | BA-9530-33 / Hydrochloric<br>Acid, Instra-Analyzed<br>(cs/6x2.5L) | 240415       | 11/06/2024             | 06/04/2024 /<br>Al-Terek   | 05/07/2024 /<br>Al-Terek       | M5895             |
| Supplier              | ItemCode / ItemName   | Lot #        | Expiration<br>Date     | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
| Seidler Chemical      | BA-9598-34 / Nitric Acid,<br>Instra-Analyzed (cs/4x2.5L)          | 24D1062002   | 11/29/2024             | 05/30/2024 /<br>Al-Terek   | 05/24/2024 /<br>Al-Terek       | M5915             |
|                       |   |              | <b>F</b> our institute |                            |                                | Oly surfacely     |

| Supplier         | ItemCode / ItemName   | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|------------------|---|------------|--------------------|----------------------------|--------------------------------|-------------------|
| Seidler Chemical | BA-9530-33 / Hydrochloric<br>Acid, Instra-Analyzed<br>(cs/6x2.5L) | 22G2862015 | 12/08/2024         | 06/12/2024 /<br>Al-Terek   | 06/07/2024 /<br>Al-Terek       | M5925             |

| Supplier         | ItemCode / ItemName                                      | Lot #      | Expiration<br>Date | Date Opened /<br>Opened By | Received Date /<br>Received By | Chemtech<br>Lot # |
|------------------|--|------------|--------------------|----------------------------|--------------------------------|-------------------|
| Seidler Chemical | BA-9598-34 / Nitric Acid,<br>Instra-Analyzed (cs/4x2.5L) | 24D1062002 | 12/08/2024         | 06/12/2024 /<br>Al-Terek   | 06/07/2024 /<br>Al-Terek       | M5931             |
|                  |  |            |                    |                            |                                |                   |

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

M5296 OP: 09/19/2022 BH



# **Certificate of Analysis**

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

# 1.0 ACCREDITATION / REGISTRATION

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



# 2.0 **PRODUCT DESCRIPTION**

| Product Code:       | Multi Analyte Custom Grade Solution               | n                   |
|---------------------|---|---------------------|
| Catalog Number:     | CHEM-CLP-4  |                     |
| Lot Number:         | S2-MEB711673                                      |                     |
| Matrix:             | 3% (v/v) HNO3<br>3% (v/v) HF                      |                     |
| Value / Analyte(s): | 1 000 μg/mL ea:<br>Boron,<br>Silicon,<br>Titanium | Molybdenum,<br>Tin, |

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE<br>Boron, B | CERTIFIED VALUE<br>1 000 ± 6 μg/mL                     | ANALYTE<br>Molybdenum, Mo | CERTIFIED VALUE<br>1 000 ± 6 μg/mL |          |  |  |  |
|---------------------|--|---------------------------|------------------------------------|----------|--|--|--|
| Silicon, Si         | 1 000 ± 7 μg/mL  | Tin, Sn                   | 1 000 ± 6 µg/mL                    |          |  |  |  |
| Titanium, Ti        | 1 000 ± 7 μg/mL  |                           |                                    |          |  |  |  |
| Density:            | <b>Density:</b> 1.030 g/mL (measured at $20 \pm 4$ °C) |                           |                                    |          |  |  |  |
| Assay Information:  |  |                           |                                    |          |  |  |  |
| ANALYTE             | METHOD   | NIST SRM#                 |                                    | SRM LOT# |  |  |  |
| B                   | ICP Assav  | 3107                      |                                    | 110830   |  |  |  |

| В  | ICP Assay | 3107  | 110830 |
|----|-----------|-------|--------|
| Мо | ICP Assay | 3134  | 130418 |
| Si | ICP Assay | 3150  | 130912 |
| Sn | ICP Assay | 3161a | 140917 |
| Ti | ICP Assay | 3162a | 130925 |
|    |           |       |        |

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

| Characterization of CRM/RM by Two or More Methods<br>Certified Value, X <sub>CRM/RM</sub> , where two or more methods of characterization are  | Characterization of CRM/RM by One Method<br>Certified Value, X <sub>CRM/RM</sub> , 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 <sub>CRM/RM</sub> = (X <sub>a</sub> ) (u <sub>char a</sub> )  |
| X <sub>i</sub> = mean of Assay Method i with standard uncertainty u <sub>char i</sub>  | X <sub>a</sub> = mean of Assay Method A with  |
| $w_i$ = the weighting factors for each method calculated using the inverse square of the variance:<br>$w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$   | u <sub>char</sub> a = the standard uncertainty of characterization Method A   |
| CRM/RM Expanded Uncertainty (±) = U <sub>CRM/RM</sub> = k (u <sup>2</sup> <sub>char</sub> + u <sup>2</sup> <sub>bb</sub> + u <sup>2</sup> <sub>lts</sub> + u <sup>2</sup> <sub>ts</sub> ) <sup>1/2</sup> | CRM/RM Expanded Uncertainty (±) = U <sub>CRM/RM</sub> = k (u <sup>2</sup> char a + u <sup>2</sup> bb + u <sup>2</sup> lts + u <sup>2</sup> ts) <sup>1</sup> |
| k = coverage factor = 2  | k = coverage factor = 2   |
| $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method                                | u <sub>char a</sub> = the errors from characterization  |
| ubb = bottle to bottle homogeneity standard uncertainty  | u <sub>bb</sub> = bottle to bottle homogeneity standard uncertainty   |
| u <sub>lts</sub> = long term stability standard uncertainty (storage)  | ults = long term stability standard uncertainty (storage)   |
| u <sub>te</sub> = 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  $4^{\circ} - 24^{\circ}$  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

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**

November 02, 2021

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

# 11.2 Lot Expiration Date

## - November 02, 2026

- 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:

Michael Booth Director, Quality Control

Michael 2 Booth

# Certifying Officer:

Paul Gaines Chairman / Senior Technical Director

Paul R Line



# **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 Solution             |                       |  |  |  |  |
|------------------------------------|---|-----------------------|--|--|--|--|
| Catalog Number:                    | CLPP-CAL-1                                      |                       |  |  |  |  |
| Lot Number:                        | T2-MEB714417                                    |                       |  |  |  |  |
| Matrix:                            | 5% (v/v) HNO3                                   |                       |  |  |  |  |
| Value / Analyte(s):                | 5 000 μg/mL ea:<br>Calcium,<br>Magnesium,       | Potassium,<br>Sodium, |  |  |  |  |
|                                    | 2 000 μg/mL ea:<br>Aluminum,                    | Barium,               |  |  |  |  |
|                                    | 1 000 μg/mL ea:<br>Iron,                        |                       |  |  |  |  |
|                                    | 500 μg/mL ea:<br>Nickel,<br>Zinc,<br>Manganese, | Vanadium,<br>Cobalt,  |  |  |  |  |
|                                    | 250 μg/mL ea:<br>Silver,                        | Copper,               |  |  |  |  |
|                                    | 200 μg/mL ea:<br>Chromium,                      |                       |  |  |  |  |
|                                    | 50 μg/mL ea:<br>Beryllium                       |                       |  |  |  |  |
| CERTIFIED VALUES AND UNCERTAINTIES |   |                       |  |  |  |  |

| ANALYTE<br>Aluminum, Al | CERTIFIED VALUE<br>2 000 ± 7 μg/mL | ANALYTE<br>Barium, Ba | CERTIFIED VALUE<br>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<br>Ag | METHOD<br>ICP Assay | NIST SRM#<br>3151 | SRM LOT#<br>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<br>Certified Value, X <sub>CRM/RM</sub> , where two or more methods of characterization are  | Characterization of CRM/RM by One Method<br>Certified Value, X <sub>CRM/RM</sub> , 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 <sub>CRM/RM</sub> = (X <sub>a</sub> ) (u <sub>char a</sub> )  |
| X <sub>i</sub> = mean of Assay Method i with standard uncertainty u <sub>char i</sub>  | X <sub>a</sub> = mean of Assay Method A with  |
| $w_i$ = the weighting factors for each method calculated using the inverse square of the variance:<br>$w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$   | $\mathbf{u}_{char \ a}$ = the standard uncertainty of characterization Method A   |
| CRM/RM Expanded Uncertainty (±) = U <sub>CRM/RM</sub> = k (u <sup>2</sup> <sub>char</sub> + u <sup>2</sup> <sub>bb</sub> + u <sup>2</sup> <sub>lts</sub> + u <sup>2</sup> <sub>ts</sub> ) <sup>1/2</sup> | CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$                |
| k = coverage factor = 2  | k = coverage factor = 2   |
| $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method                                | u <sub>char a</sub> = the errors from characterization  |
| ubb = bottle to bottle homogeneity standard uncertainty  | ubb = bottle to bottle homogeneity standard uncertainty   |
| u <sub>lts</sub> = long term stability standard uncertainty (storage)  | ults = long term stability standard uncertainty (storage)   |
| u <sub>te</sub> = 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

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#### 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



**Certificate of Analysis** 

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

# 1.0 ACCREDITATION / REGISTRATION

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



# 2.0 **PRODUCT DESCRIPTION**

| Product Code:       | Multi Analyte Custom Grade Soluti        | on                 |
|---------------------|--|--------------------|
| Catalog Number:     | CLPP-CAL-3                               |                    |
| Lot Number:         | T2-MEB714159                             |                    |
| Matrix:             | 7% (v/v) HNO3                            |                    |
| Value / Analyte(s): | 1 000 μg/mL ea:<br>Arsenic,<br>Selenium, | Lead,<br>Thallium, |
|                     | 500 μg/mL ea:<br>Cadmium                 |                    |

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

| ANALYTE<br>Arsenic, As | CERTIFIED VALUE<br>1 000 ± 8 µg/mL | ANALYTE<br>Cadmium, Cd | CERTIFIED VALUE<br>500.0 ± 2.1 μg/mL |
|------------------------|------------------------------------|------------------------|--------------------------------------|
| Lead, Pb               | 1 000 ± 5 μg/mL                    | Selenium, Se           | 1 000 ± 8 μg/mL                      |
| Thallium, Tl           | 1 000 ± 7 μg/mL                    |                        |                                      |

Density:

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

# Assay Information:

| ANALYTE | METHOD    | NIST SRM# | SRM LOT# |
|---------|-----------|-----------|----------|
| As      | ICP Assay | 3103a     | 100818   |
| Cd      | ICP Assay | 3108      | 130116   |
| Cd      | EDTA      | 928       | 928      |
| Pb      | ICP Assay | 3128      | 101026   |
| Pb      | EDTA      | 928       | 928      |
| Se      | ICP Assay | 3149      | 100901   |
| 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<br>Certified Value, X <sub>CRM/RM</sub> , where two or more methods of characterization are  | Characterization of CRM/RM by One Method<br>Certified Value, X <sub>CRM/RM</sub> , 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 <sub>CRM/RM</sub> = (X <sub>a</sub> ) (u <sub>char a</sub> )  |
| X <sub>i</sub> = mean of Assay Method i with standard uncertainty u <sub>char i</sub>  | X <sub>a</sub> = mean of Assay Method A with  |
| $w_i$ = the weighting factors for each method calculated using the inverse square of the variance:<br>$w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2)$   | $\mathbf{u}_{char \ a}$ = the standard uncertainty of characterization Method A   |
| CRM/RM Expanded Uncertainty (±) = U <sub>CRM/RM</sub> = k (u <sup>2</sup> <sub>char</sub> + u <sup>2</sup> <sub>bb</sub> + u <sup>2</sup> <sub>lts</sub> + u <sup>2</sup> <sub>ts</sub> ) <sup>1/2</sup> | CRM/RM Expanded Uncertainty (±) = $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$                |
| k = coverage factor = 2  | k = coverage factor = 2   |
| $\mathbf{u_{char}} = \left[\sum ((\mathbf{w_i})^2 (\mathbf{u_{char}})^2)\right]^{\frac{1}{2}}$ where $\mathbf{u_{char}}$ are the errors from each characterization method                                | u <sub>char a</sub> = the errors from characterization  |
| ubb = bottle to bottle homogeneity standard uncertainty  | ubb = bottle to bottle homogeneity standard uncertainty   |
| u <sub>lts</sub> = long term stability standard uncertainty (storage)  | ults = long term stability standard uncertainty (storage)   |
| u <sub>te</sub> = 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  $4^{\circ} - 24^{\circ}$  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

# 8.0 HAZARDOUS INFORMATION

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

#### 9.0 HOMOGENEITY

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

#### 10.0 QUALITY STANDARD DOCUMENTATION

## 10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

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

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

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

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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#### 11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

## 11.1 Certification Issue Date

## January 13, 2022

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

# 11.2 Lot Expiration Date

## - January 13, 2027

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

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

## 11.3 Period of Validity

- Sealed TCT Bag Open Date:

- 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

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com          | *   |                                     | Certified Reference Material CRM                                    | eference M               | Naterial CR              | М                      |                            | <b>\$</b>  | AN<br>AF<br>https | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |
|--|---|-------------------------------------|---|--------------------------|--------------------------|------------------------|----------------------------|--|-------------------|--|
| <u>CERTIFIED WEIGHT REPORT:</u><br>Part Number:<br>Lot Number:<br>Description: | <u>57048</u><br><u>072821</u><br>Cadmium (Cd) | ğ                                   |   | <b>Lot</b> #<br>20370011 | Solvent:<br>Nitric Acid  |                        | Hind                       | forannie E   | speate            | ~  |
| Expiration Date:   | 072824  |                                     |   | 2.0%                     | 40.0                     | Nitric Acid            | Formulated By:             |  | Giovanni Esposito | 072821   |
| Recommended Storage:   | Ambient (20 °C)                               | C)                                  |   |                          | (111)                    |                        | Ŋ                          | e de la construcción de la const |                   |  |
| Nominal Concentration (µg/mL):   | 611TB   | л                                   |   |                          |                          |                        |                            |  | India I Donton    | 862U   |
| Volume shown below was diluted to (mL):  |   | 2000.02 0.058                       | 58 Flask Uncertainty  | / 1119                   |                          | E                      |                            |  |                   | 01 505 1   |
|  | •   |                                     |   | •                        | •                        | •                      | Expanded                   |  | SDS Information   | ation  |
| Compound Nu  | Part Lot<br>Number Number                     | Dilution Initial<br>Factor Vol. (ml | Initial Uncertainty Nominal<br>Vol. (mL) Pipette (mL) Conc. (µg/mL) |                          | Initial<br>Conc. (µg/mL) | Final<br>Conc. (µg/mL) | Uncertainty<br>+/- (µg/mL) | (Solvent<br>CAS#   | OSHA PEL (TWA)    | AS# OSHA PEL (TWA) LD50  |
| 1. Cadmium nitrate tetrahydrate (Cd) 58  | 58148 010920                                  | 0.1000 200.0                        | 0.0 0.084   | 1000                     | 10000.5                  |                        | 2.2                        | 10022-68-1   | 0.2 mg/m3         | orl-rat 300 mg/kg  |
| [1] Spectrum No.1  | -   | 3.363 sec]::                        | 33.363 sec]:57048.D# [Count] [Linear]                               | Count] [Lin              |                          | 1000.0                 |                            |  |                   |  |
| 1.0E8-<br>-  |   |                                     |   |                          | nearj                    | 1000.0                 |                            |  |                   |  |
| m/z->  |   |                                     |   |                          | near]                    | 1000.0                 |                            |  |                   |  |
| 2.0E4  | N<br>0  | 8 <u>0</u>                          | 40<br>0   | ы<br>О                   | 10 ar]<br>60             | 1000.0<br>70           |                            | 8<br>0   | 00                | 100  |
|  | N_<br>0                                       | <u>a</u><br>0                       | 40<br>0   | თ_<br>0                  |                          | 1000.0                 |                            | õ  | 9 <mark>0</mark>  | 100  |
| 1.0E4  | N O   | 8                                   | 4<br>0  | <u>ຮ</u>                 | •                        | 1000.0                 |                            | ŏ  | Ø<br>O            | 100  |
| 1.0E4-<br>m/z-> 110  | 120   | 13-<br>3-                           | 40<br>0<br>0  | 150<br>0                 |                          | 1000.0<br>7 O          |                            | 180  | 90<br>00          |  |
|  | 100<br>00                                     | 130                                 | 14<br>6   | ក្<br>ទ                  |                          | 1000.0                 |                            | 81 Ö   | 000               |  |





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

|    |       |       |       |                     |       |    | Trace M | letals | Verifica | tion t         | oy ICP-N | <u></u> Ω) S  | J/mL) |    |       |    |        |    |       |
|----|-------|-------|-------|---------------------|-------|----|---------|--------|----------|----------------|----------|---------------|-------|----|-------|----|--------|----|-------|
|    |       |       |       |                     |       |    |         |        |          |                |          |               |       |    |       |    |        |    |       |
| A1 | <0.02 | Cd    | Т     | Dy                  | <0.02 | Hf | <0.02   | Li     | <0.02    | Ni             | <0.02    | Pr            | <0.02 | Se | <0.2  | Tb | < 0.02 | W  | <0.02 |
| Sр | <0.02 | $C_a$ | <0.2  | ĥ                   | <0.02 | Ho | <0.02   | Lu     | <0.02    | Ъ              | <0.02    | Re            | <0.02 | Si | <0.02 | Te | <0.02  | Ч  | <0.02 |
| As | <0.2  | Ce    | <0.02 | Eu                  | <0.02 | In | <0.02   | Mg     | < 0.01   | O <sub>s</sub> | <0.02    | Rh            | <0.02 | Ag | <0.02 | Ц  | <0.02  | <  | <0.02 |
| Ва | <0.02 | Cs    | <0.02 | $\operatorname{Gd}$ | <0.02 | Ir | <0.02   | Mn     | <0.02    | Pd             | <0.02    | Rb            | <0.02 | Na | <0.2  | Th | <0.02  | Чł | <0.02 |
| Be | <0.01 | Ω     | <0.02 | Ga                  | <0.02 | Fe | <0.2    | Hg     | <0.2     | Р              | <0.02    | Ru            | <0.02 | Sr | <0.02 | Tm | <0.02  | Y  | <0.02 |
| Bi | <0.02 | °.    | <0.02 | Ge                  | <0.02 | La | <0.02   | Mo     | <0.02    | Pŧ             | <0.02    | $\mathbf{Sm}$ | <0.02 | s  | <0.02 | Sn | <0.02  | Zn | <0.02 |
| В  | <0.02 | Ĉ     | <0.02 | Au                  | <0.02 | РЬ | <0.02   | Nd     | <0.02    | K              | <0.2     | Sc            | <0.02 | Ta | <0.02 | Ti | <0.02  | Zr | <0.02 |

(T)= Target analyte

# **Physical Characterization:**

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

sold in the second second

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).

www.absolutestandards.com Absolute Standards, Inc. 800-368-1131 CERTIFIED WEIGHT REPORT: Lead (II) Nitrate (Pb) Compound Nominal Concentration (µg/mL): m/z-> m/z-> m/z-> 2.0E6 5.0E4 Recommended Storage: 5.0E4 1.0E6 1.0E5-1.0E5 Volume shown below was diluted to (mL): **NIST Test Number:** Expiration Date: Part Number: Lot Number: Description: [1] Spectrum No.1 210 110 0 58182 Number Part <u>57082</u> 062221 Lead (Pb) 6UTB 1000 062224 Ambient (20 °C) 032321 Number Lot 120 N20 N\_ 0 [ 14.144 sec]:58082.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor 130 230 β 5E-05 Vol. (mL) 0.058 200.0 Initial **Certified Reference Material CRM** Pipette (mL) Conc. (µg/mL) Balance Uncertainty Flask Uncertainty Uncertainty 40 N 40 0.084 40 20370011 Nominal Lot # 2.0% 1000 N 0 0 150 ທ 0 Conc. (µg/mL) Nitric Acid Solvent: 10000.1 Initial (mL) 40.0 260 160 00 Conc. (µg/mL) Nitric Acid 1000.0 Final 170 0 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Expanded 2.2 Revence 180 0 0 10099-74-8 Ś CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) Pedro L. Rentas ent Lawrence Barry 190 00 0.05 mg/m3 SDS Information 2 https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number 200 100 intrvns-rat 93 mg/kg 3128 LD50 062221 062221 SRM NIST





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

|    |       |    |       |    |       |    | Trace M | etals | Verifica | tion b | oy ICP-N | <u>μ</u> ) Sl | g/mL) |    |       |    |       |    |       |
|----|-------|----|-------|----|-------|----|---------|-------|----------|--------|----------|---------------|-------|----|-------|----|-------|----|-------|
| Al | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02   | Li    | <0.02    | Ni     | <0.02    | Pr            | <0.02 | Se | <0.2  | ТЪ | <0.02 | W  | <0.02 |
| Sp | <0.02 | Ca | <0.2  | Ęŗ | <0.02 | Ho | <0.02   | Lu    | <0.02    | Nb     | <0.02    | Re            | <0.02 | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | Ce | <0.02 | Eu | <0.02 | In | <0.02   | Mg    | <0.01    | Os     | <0.02    | Rh            | <0.02 | Ag | <0.02 | TI | <0.02 | V  | <0.02 |
| Ва | <0.02 | Cs | <0.02 | Gd | <0.02 | ŀ  | <0.02   | Mn    | <0.02    | Pd     | <0.02    | Rb            | <0.02 | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Be | <0.01 | Cr | <0.02 | Ga | <0.02 | Fe | <0.2    | Hg    | <0.2     | Р      | <0.02    | Ru            | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02   | Mo    | <0.02    | Pt     | <0.02    | Sm            | <0.02 | s  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| в  | <0.02 | C, | <0.02 | Au | <0.02 | Рь | Т       | Nd    | <0.02    | Κ      | <0.2     | Sc            | <0.02 | Ta | <0.02 | Ti | <0.02 | Zr | <0.02 |

(T)= Target analyte

# **Physical Characterization:**

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

In P. Sold

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).

www.absolutestandards.com Absolute Standards, Inc. 800-368-1131 CERTIFIED WEIGHT REPORT: Selenium(IV) oxide (Se) Compound Nominal Concentration (µg/mL): m/z-> m/z-> m/z-> 2.0E8-2.0E8-**Recommended Storage:** 1.0E8 1.0E8 1.0∏4 2.0E4 Volume shown below was diluted to (mL): **NIST Test Number:** Expiration Date: Part Number: Lot Number: Description: [1] Spectrum No.1 110 N10 1 0 58134 Number Part <u>57034</u> 070221 Selenium (Se) 070224 6UTB 1000 Ambient (20 °C) 021621 Number Lot N20 N<u>.</u> 0 120 [ 33.702 sec]:58034.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor α<u>.</u> Ο 230 130 5E-05 Vol. (mL) 0.058 200.0 Initial **Certified Reference Material CRM** Pipette (mL) Conc. (µg/mL) Balance Uncertainty Flask Uncertainty Uncertainty N40 40 4 0 0.084 20370011 Nominal Lot # 2.0% 1000 250 150 () 0 Conc. (µg/mL) Nitric Acid Solvent: 10000.2 Initial (mL) 40.0 6<u>.</u> 0 N60 160 Conc. (µg/mL) Nitric Acid 1000.0 Final 170 07 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Expanded Giovannie 2.2 180 80 7446-08-4 ŝ CAS# (Solvent Safety Info. On Attached pg.) Labour OSHA PEL (TWA) Pedro L. Rentas Giovanni Esposito e de 190 0 SDS Information 0.2 mg/m3 https://Absolutestandards.com ANAB ISO 17034 Accredited AR-1539 Certificate Number 200 100 orl-rat 68 mg/kg LD50 070221 070221 3149 NIST SRM

Part # 57034 Lot # 070221

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

|    |       |       |       |                     |       |    | Trace M | Metals | Verifica | tion    | by ICP-N | <u></u> μ) SI | g∕mL) |    |       |    |       |    |       |
|----|-------|-------|-------|---------------------|-------|----|---------|--------|----------|---------|----------|---------------|-------|----|-------|----|-------|----|-------|
|    | •     |       | 0     |                     |       |    |         |        |          |         |          |               |       |    | B     |    |       |    |       |
| Al | <0.02 | Cd    | <0.02 | Dy                  | <0.02 | Hf | <0.02   | Li     | <0.02    | Ni      | <0.02    | $\mathbf{Pr}$ | <0.02 | Se | Т     | ТЪ | <0.02 | W  | <0.02 |
| Sp | <0.02 | $C_a$ | <0.2  | Ę                   | <0.02 | Ho | <0.02   | Lu     | <0.02    | Np      | <0.02    | Re            | <0.02 | Si | <0.02 | Te | <0.02 | Ц  | <0.02 |
| As | <0.2  | Ce    | <0.02 | Eu                  | <0.02 | In | <0.02   | Mg     | <0.01    | $O_{s}$ | <0.02    | Rh            | <0.02 | Ag | <0.02 | TI | <0.02 | V  | <0.02 |
| Ва | <0.02 | Cs    | <0.02 | $\operatorname{Gd}$ | <0.02 | ŀ  | <0.02   | Mn     | <0.02    | Pd      | <0.02    | Rb            | <0.02 | Na | <0.2  | Th | <0.02 | Ч  | <0.02 |
| Be | <0.01 | Ω     | <0.02 | Ga                  | <0.02 | Fe | <0.2    | Hg     | <0.2     | P       | <0.02    | Ru            | <0.02 | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| Bi | <0.02 | °.    | <0.02 | Ge                  | <0.02 | La | <0.02   | Mo     | <0.02    | Pt      | <0.02    | Sm            | <0.02 | s  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| В  | <0.02 | Cu    | <0.02 | Au                  | <0.02 | Рь | <0.02   | Nd     | <0.02    | Κ       | <0.2     | Sc            | <0.02 | Та | <0.02 | Ti | <0.02 | Zr | <0.02 |
|    |       |       |       |                     |       |    |         |        |          |         |          |               |       |    |       |    |       |    |       |

(T)= Target analyte

# **Physical Characterization:**

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

- 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.

- 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).

| ANAB ISO 17<br>AR-1539 Cer<br>https://Absolute<br>d By: Giovanni Esposito<br>By: Pedro L. Rentas<br>ty (Solvent Safety Info. On Attached pg.)<br>nL) CAS# OSHA PEL (TWA) LD50<br>7761-88-8 10 ug/m3 N/A |
|---|
|   |
| AR-15:<br>https://At<br>Giovanni Esposito<br>Pedro L. Rentas<br>SDS Information<br>ent Safety Info. On Attac<br>OSHA PEL (TWA)<br>10 ug/m3  |

1 of 2

Part # 57047

Lot # 072921

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

|       |    |       |    |       |               |       |        |          | analyte     | (T)= Target analyte |        |         |    |       |    |       |       |        |    |
|-------|----|-------|----|-------|---------------|-------|--------|----------|-------------|---------------------|--------|---------|----|-------|----|-------|-------|--------|----|
| <0.02 | Zr | <0.02 | Ti | <0.02 | Та            | <0.02 | Sc     | <0.2     | K           | <0.02               | Nd     | <0.02   | Рь | <0.02 | Au | <0.02 | Cu    | <0.02  | в  |
| <0.02 | Zn | <0.02 | Sn | <0.02 | s             | <0.02 | Sm     | <0.02    | Pt          | <0.02               | Mo     | <0.02   | La | <0.02 | Ge | <0.02 | C°    | <0.02  | Bi |
| <0.02 | Y  | <0.02 | Tm | <0.02 | $\mathbf{Sr}$ | <0.02 | Ru     | <0.02    | P           | <0.2                | Hg     | <0.2    | Fe | <0.02 | Ga | <0.02 | Ç     | < 0.01 | Be |
| <0.02 | Yb | <0.02 | Th | <0.2  | Na            | <0.02 | Rb     | <0.02    | Pd          | <0.02               | Mn     | <0.02   | Ir | <0.02 | Gd | <0.02 | Cs    | <0.02  | Ba |
| <0.02 | V  | <0.02 | Π  | Т     | Ag            | <0.02 | Rh     | <0.02    | $O_{\rm S}$ | < 0.01              | Mg     | <0.02   | In | <0.02 | Eu | <0.02 | Ce    | <0.2   | As |
| <0.02 | U  | <0.02 | Te | <0.02 | Si            | <0.02 | Re     | <0.02    | Nb          | <0.02               | Lu     | <0.02   | Ho | <0.02 | Er | <0.2  | $C_a$ | <0.02  | Sp |
| <0.02 | W  | <0.02 | Ть | <0.2  | Se            | <0.02 | Pr     | <0.02    | Ni          | <0.02               | Li     | <0.02   | Hf | <0.02 | Dy | <0.02 | Cd    | <0.02  | Al |
|       |    |       |    |       |               |       |        |          |             |                     |        |         |    |       |    |       |       |        |    |
|       |    |       |    |       |               | g/mL) | 1S (μι | by ICP-N | tion        | Verifica            | letals | Irace N |    |       |    |       |       |        |    |
|       |    |       |    |       |               |       |        |          | •           |                     | -      |         |    |       |    |       |       |        |    |

# **Physical Characterization:**

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

n for the

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).

| ADSOLUTE Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    | CERTIFIED WEIGHT REPORT:<br>Part Number: | Lot Number:<br>Description:    | Expiration Date: | Recommended Storage:<br>Nominal Concentration (µg/mL): | NIST Test Number:         | Volume shown below was diluted to (mL): |  | Compound                    | 1. Ammonium hexafluorotitanate (Ti) | 1.0E5 | 0.<br>0.<br>1.<br> | m/z-> | 2.0E8<br> | 1.0E8-<br>-<br>- | m/z-> | 5.0E7<br>-<br>-<br>- | 2.5E7 | m/z-> |
|--|--|--------------------------------|------------------|--|---------------------------|---|--|-----------------------------|-------------------------------------|-------|--------------------|-------|-----------|------------------|-------|----------------------|-------|-------|
| · ·  | nber:                                    | nber:<br>tion:                 | Date:            | /mL):  | nber:                     | ow was dil                              | Part                                   | Number                      | ) 58122                             |       |                    | 10    |           |                  | 110   |                      |       | 210   |
|  | 57022                                    | <u>070721</u><br>Titanium (Ti) | 070724           | Ambient (20 °C)<br>1000                                | 6UTB                      | uted to (mL):                           | Lot                                    | er Number                   | 2 070120                            |       |                    | 20    |           |                  | 120   |                      |       | 220   |
|  |  | <u>ii</u>                      | 2                | °C)  | <u>5</u>                  | 2000.02 0                               | Dilution                               | Factor Vc                   | 0.1000 2                            |       |                    | 30    |           |                  | 130   |                      |       | 230   |
| Certified  |  |                                |                  |  | 5E-05 Balance Uncertainty | 0.058 Flask Uncertainty                 | Initial Uncertainty                    | Vol. (mL) Pipette           | 200.0 0.084                         |       |                    | 40    |           |                  | 140   |                      |       | 240   |
| l Reference  | Lot #<br>20370011                        | 2.0%                           |                  |  | certainty                 | tainty                                  | y Nominal                              | Conc. (µg/mL)               | 1000                                |       |                    | 50    |           |                  | 150   |                      |       | 250   |
| Certified Reference Material CRM   | Solvent:<br>Nitric Acid                  | 40.0                           | (mL)             |  |                           |   | Initial                                | Conc. (µg/mL) Conc. (µg/mL) | 10000.1                             |       |                    | 60    |           |                  | 160   |                      |       | 260   |
| ×.   |  | Nitric Acid                    |                  |  | R                         |   | Final                                  |                             | 1000.0                              |       |                    | 70    |           |                  | 170   |                      |       |       |
|  |  | Formulated By:                 |                  | Kercu  | Reviewed By:              | -                                       | Uncertainty                            | +/- (µg/mL)                 | 2.2 16                              |       |                    | 8.0   |           |                  | 180   |                      |       |       |
|  |  | lonce                          | ~                | a<br>R   | Pedi                      | ŋ                                       | (Solvent S                             | CAS# OSH                    | 16962-40-6 2.5                      |       |                    | 06    |           |                  | 190   |                      |       |       |
| ANAE<br>AR-1<br>https://   |  | Lawrence Barry                 | $\mathcal{O}$    | à  | Pedro L. Rentas           |   | (Solvent Safety Info. On Attached pg.) | OSHA PEL (TWA)              | 2.5 (F) mg/m3                       |       |                    |       |           |                  |       |                      |       |       |
| ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |  | 070721                         |                  |  | 070721                    | i                                       | tached pg.)                            | LD50                        | NA                                  |       |                    | 100   |           |                  | 200   |                      |       |       |
| Accredite<br>ate Numbe<br>ndards.con   |  | 21                             |                  |  | 721                       |   | NIST                                   | SRM                         | 3162a                               |       |                    |       |           |                  |       |                      |       |       |

Part # 57022 Lot # 070721

1 of 2

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

|    |       |    |       |    |       |    | ITACE M | letais | Verilica |    | by ICP-M | <u>10 (µy</u> | J/ [[ L] |    |       |    |       | ĺ  |       |
|----|-------|----|-------|----|-------|----|---------|--------|----------|----|----------|---------------|----------|----|-------|----|-------|----|-------|
| AI | <0.02 | Cd | <0.02 | Dy | <0.02 | Hf | <0.02   | Li     | <0.02    | Ni | <0.02    | Pr            | <0.02    | Se | <0.2  | ТЪ | <0.02 | W  | <0.02 |
| Sp | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02   | Lu     | <0.02    | Nb | <0.02    | Re            | <0.02    | Si | <0.02 | Te | <0.02 | U  | <0.02 |
| As | <0.2  | ଜ  | <0.02 | Eu | <0.02 | In | <0.02   | Mg     | <0.01    | Os | <0.02    | Rh            | <0.02    | Ag | <0.02 | TI | <0.02 | V  | <0.02 |
| Ва | <0.02 | Cs | <0.02 | Gd | <0.02 | ŀ  | <0.02   | Mn     | <0.02    | Pd | <0.02    | Rb            | <0.02    | Na | <0.2  | Th | <0.02 | Yb | <0.02 |
| Ве | <0.01 | Ω  | <0.02 | Ga | <0.02 | Fe | <0.2    | Hg     | <0.2     | Р  | <0.02    | Ru            | <0.02    | Sr | <0.02 | Tm | <0.02 | Y  | <0.02 |
| B: | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02   | Mo     | <0.02    | Pt | <0.02    | Sm            | <0.02    | s  | <0.02 | Sn | <0.02 | Zn | <0.02 |
| в  | <0.02 | Cu | <0.02 | Au | <0.02 | РЬ | <0.02   | Nd     | <0.02    | Κ  | <0.2     | Sc            | <0.02    | Ta | <0.02 | Ti | Т     | Zr | <0.02 |

(T)= Target analyte

## Physical Characterization:

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

In P. She

Certified by:

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

the preparation of all standards.

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

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

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

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

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com   | *                                       |                                       | Certified R            | Certified Reference Material CRM                  | faterial CRI                                 |                    |   | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |
|---|---|---------------------------------------|------------------------|---|--|--------------------|---|--|
| CERTIFIED WEIGHT REPORT:<br>Part Number:<br>Lot Number:<br>Description: | <u>57081</u><br>073021<br>Thallium (TI) |                                       |                        | <b>Lot</b> #<br>20370011                          | Solvent:<br>Nitric Acid                      | Z                  | Liovannie                                 | Especto  |
| Expiration Date:  | 073024                                  |                                       |                        | 2.0%  | 40.0<br>(mL)                                 | Nitric Acid Formul | Formulated By:                            | Giovanni Esposito  |
| Recommended Storage:<br>Nominal Concentration (µq/mL):                  | Ambient (20 °C)<br><b>1000</b>          | C)                                    |                        |   |  | <u>}(</u>          | en la | theres   |
| NIST Test Number:   | 6UTB                                    | 5E-05                                 | 05 Balance Uncertainty | linty   |  | Reviewed By:       | ed By:                                    | Pedro L. Rentas  |
| Volume shown below was diluted to (mL):                                 | diluted to (mL):                        | 2000.02 0.058                         | 58 Flask Uncertainty   | ţy  |  | Expanded           | ded                                       | SDS Information  |
| Compound  | Part Lot<br>Number Number               | Dilution Initial<br>Factor Vol. (mL)  |                        | Uncertainty Nominal<br>Pipette (mL) Conc. (ua/mL) | Initial Final<br>Conc. (ua/mL) Conc. (ua/mL) | . –                | ) CAS                                     | (Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50                          |
|   |   |                                       |                        | 1000  | 10001 0                                      |                    | 77  |  |
| [1] Spectrum No.1   | -                                       | 14.044 sec]:57081.D# [Count] [Linear] | 57081.D# [0            | Sount] [Lin                                       | ıear]  |                    |   |  |
| 1.0E6 .   |   |                                       |                        |   |  |                    |   |  |
|   |   |                                       |                        |   |  |                    |   |  |
| 1.0E4   | N.<br>O                                 | ω<br>O                                | 4.<br>0                | 8   | 8  | 70<br>0            | 0<br>0                                    | 0<br>0   |
|   | N.<br>O                                 | <u>ω</u> .<br>Ο                       | 6<br>0                 | 5   | <u>8</u>                                     | 8                  | 80  | 9<br>0   |
|   | N O                                     | θ                                     | 4<br>0                 | 8-  | 8  | 8                  | 0<br>0<br>0                               | 9<br>0   |
|   | 120                                     | 130                                   | 140<br>0               | 150<br>0  | 1<br>60<br>8                                 | 170                | 180 80                                    | 90<br>0  |
|   | 12<br>0                                 | 130                                   | 4<br>6<br>0            | 1<br>ნი<br>0                                      |  | 4<br>6             | 180<br>08                                 | 100<br>0000000000000000000000000000000000  |





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

|                     |       |               |       | <b>-</b>            | F              |       |               |                 |   |
|---------------------|-------|---------------|-------|---------------------|----------------|-------|---------------|-----------------|---|
|                     | В     | Bi            | Be    | Ва                  | $A_S$          | Sp    | AI            |                 |   |
|                     | <0.02 | <0.02         | <0.01 | <0.02               | <0.2           | <0.02 | <0.02         |                 |   |
|                     | Cu    | ĉ             | Ω     | Cs                  | Ce             | Ca    | Cd            |                 |   |
|                     | <0.02 | <0.02         | <0.02 | <0.02               | <0.02          | <0.2  | <0.02         |                 |   |
|                     | Au    | Ge            | Ga    | $\operatorname{Gd}$ | Eu             | Er    | Dy            |                 |   |
|                     | <0.02 | <0.02         | <0.02 | <0.02               | <0.02          | <0.02 | <0.02         |                 |   |
|                     | Рb    | La            | Fe    | lr                  | In             | Ho    | Hf            |                 |   |
|                     | <0.02 | <0.02         | <0.2  | <0.02               | <0.02          | <0.02 | <0.02         | Irace M         | 1 |
|                     | Nd    | Mo            | Hg    | Mn                  | Mg             | Lu    | Li            | letais          | - |
| (T)= Target analyte | <0.02 | <0.02         | <0.2  | <0.02               | <0.01          | <0.02 | <0.02         | Verifica        | : |
| analyte             | K     | ₽             | P     | Pd                  | O <sub>s</sub> | Nb    | Ni            | tion            | • |
|                     | <0.2  | <0.02         | <0.02 | <0.02               | <0.02          | <0.02 | <0.02         | by ICP-N        |   |
|                     | Sc    | $\mathbf{Sm}$ | Ru    | Rb                  | Rh             | Re    | $\mathbf{Pr}$ | 15 ( <i>µ</i> ( | 5 |
|                     | <0.02 | <0.02         | <0.02 | <0.02               | <0.02          | <0.02 | <0.02         | J/mL)           | ~ |
|                     | Та    | s             | Sr    | Na                  | Ag             | Si    | Se            |                 |   |
|                     | <0.02 | <0.02         | <0.02 | <0.2                | <0.02          | <0.02 | <0.2          |                 |   |
|                     | Ti    | Sn            | Tm    | Th                  | TI             | Te    | Tb            |                 |   |
|                     | <0.02 | <0.02         | <0.02 | <0.02               | Т              | <0.02 | <0.02         |                 |   |
|                     | Zr    | Zn            | Y     | Yь                  | V              | П     | 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.

n for the second

Certified by:

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

| m/z-> | N.<br>55<br>100                          | m/z-≻<br>5.0E6 | 1.006 | 11/2-2<br>2.0E6 | 2.5E7 | 5.0E7                                 | 1. Indium Oxide (In) | Compound   | Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Test Number:<br>Weight shown below wa  | Expi              | CERTIFIED WEIGHT REPORT:<br>Part<br>Lot    | www.absolutestandards.com     |
|-------|--|----------------|-------|-----------------|-------|---------------------------------------|----------------------|--|---|-------------------|--|-------------------------------|
| 210   |  | 110            |       | 10              |       | [1] Spectrum No.1                     | IN086                | RM#  | Recommended Storage: Ambient (J         Il Concentration (Jug/mL):       10000         NIST Test Number:       6UTB         Weight shown below was diluted to (mL): | Expiration Date:  | <u>ORT:</u><br>Part Number:<br>Lot Number: | п                             |
| 220   |  | 120            |       | NO              |       | -                                     | 86 W1096A            |  | Ambient (20 °C)<br>10000<br>6UTB<br>uted to (mL): 50  | 100724            | 58149<br>100721<br>Indium (In)             |                               |
| 230   |  | 130            |       | 30              |       | 12.965 sec]                           | 10000 99.999         | Nominal Purity<br>Conc. (µg/mL) (%)  | 0.06  |                   | -  | NAGIO                         |
| 240   |  | 140            |       | 4<br>0          |       | 12.965 sec]:57049.D# [Count] [Linear] | 0.10                 | Uncertainty<br>Purity (%)  | 5E-05 Balance Uncertainty<br>0.058 Flask Uncertainty  |                   | Solvent:                                   | R: 10/08                      |
| 250   |  | 150            |       | 50              |       | [Count] [Lin                          | 82.6 6.05408         | Assay Target<br>(%) Weight (g)   | inty<br>Y   | 5% 25.0<br>(mL)   | Lot #<br>ent: 20370011                     | 121                           |
| 260   |  | 160            |       | 0               |       | ear]                                  | 6.05441              | Actual<br>Weight (g)   |   | Nitric Acid       | Nitric Acid                                | Ð                             |
|       |  | 170            |       | 70              |       |                                       | 10000.6 2            | Exp<br>Actual Unce<br>Conc. (µg/mL) +/- (  | Revi  | Form              | re   |                               |
|       |  | 180            |       | 80              |       |                                       | 20.1 1312-43-2       | Expanded<br>Uncertainty (Sol<br>+/- (µg/mL) CAS#                                   | Reviewed By:  | Formulated By:    | fioranci                                   |                               |
|       |  | 190            |       | 00              |       |                                       | NA                   | SDS Informa<br>olvent Safety Info. On<br>OSHA PEL (TWA)                            | Pedro L. Rentas   | Giovanni Esposito | Cape                                       |                               |
|       |  | 200            |       | 100             |       |                                       | NA                   | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50 |   |                   | A  | https://Absolutestandards.com |
|       | n an |                |       |                 |       |                                       | 3124a                | NIST   | 100721  | 100721            |  | tandards.co                   |

1 of 2

Part # 58149

Lot # 100721

Printed: 10/7/2021, 2:18:03 PM

| 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 Spectroscopy (ICP-MS):

|    |       |                |       |    |       |    | Trace Me | etals | Verificat | ion b | y ICP-MS | (hð  | /mL)  | -  |       |        |       |    |       |
|----|-------|----------------|-------|----|-------|----|----------|-------|-----------|-------|----------|------|-------|----|-------|--------|-------|----|-------|
| 2  | <0.02 | Cd             | <0.02 | Dy | <0.02 | Hf | <0.02    | 5     | <0.02     | N.    | <0.02    | - PA | <0.02 | Se | <0.2  | 1 11 1 | 40.02 | W  | 40.02 |
| Sb | <0.02 | Ca             | <0.2  | Ę  | <0.02 | Но | <0.02    | L     | <0.02     | Nb    | <0.02    | Re   | <0.02 | S  | <0.02 | Te     | <0.02 | с  | <0.02 |
| As | <0.2  | Ce             | <0.02 | E  | <0.02 | In | Т        | Mg    | <0.01     | õ     | <0.02    | Rh   | <0.02 | Ag | <0.02 | Н      | <0.02 | <  | <0.02 |
| Ba | <0.02 | Cs             | <0.02 | Gd | <0.02 | Ŀ  | <0.02    | Mn    | <0.02     | Pd    | <0.02    | Rb   | <0.02 | Na | 40.2  | Th     | <0.02 | ΥЪ | <0,02 |
| Be | <0.01 | Ç              | <0.02 | Ga | <0.02 | Fe | <0.2     | Hg    | <0.2      | P     | <0.02    | Ru   | <0.02 | Sr | <0.02 | Tm     | <0.02 | Y  | <0.02 |
| Bi | <0.02 | C <sub>0</sub> | <0.02 | ଜୁ | <0.02 | La | <0.02    | Mo    | <0.02     | Pt    | <0.02    | Sm   | <0.02 | s  | <0.02 | Sn     | <0.02 | 2  | <0.02 |
| в  | <0.02 | Cu             | <0.02 | Au | <0.02 | РЬ | <0.02    | Nd    | <0.02     | ~     | <02      | Sc   | <0.02 | Ta | <0.02 | Н      | <0.02 | Z  | <0.02 |
|    |       |                |       |    |       |    |          |       |           |       |          |      |       |    |       |        |       |    |       |

(I)= larget analyte

Physical Characterization:

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

the 1. - 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 # 58139 Lot # (           | m/z-> | 1.0E5 | m/z-><br>2.0E5 | 2.5E4 | m/z-><br>5.0E4 | 1.0E6  | 2.0E6                                 | 1. Yttrium (III) Oxide (Y) | Weight show<br>Compound  | NIST T                    | Recommended Storage:<br>Nominal Concentration (µg/mL): | Π              | <u>Ventiried weight her Ont.</u><br>Lot<br>Des | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com  |
|--------------------------------|-------|-------|----------------|-------|----------------|--|---------------------------------------|----------------------------|--|---------------------------|--|----------------|--|--|
| Lot # 052521                   | 210   |       | 110            |       | 10             |  | [1] Spectrum No.1                     | INOR                       | Weight shown below was diluted to (mL):                              | NIST Test Number:         | nended Storage:<br>ntration (µg/mL):                   | -              | Part Number:<br>Lot Number:<br>Description:    | s, Inc.  |
|                                | 220   |       | 120            |       | 20             |  | _                                     | IN087 YV012015B1           |  | 6UTB                      | Ambient (20 °C)<br>10000                               | 0.000          | <u>58139</u><br>052521<br>Yttrium (Y)          |  |
|                                | 230   |       | 130            |       | ů              |  | 12.624 sec                            | 10000 99                   | 2000.02 0.0<br>Nominal PL<br>Conc. (µg/mL) ()                        | 5E                        | °C)  | ŀ              |  | M4961  |
|                                | 240   |       | 140            |       | 40             |  | 12.624 sec]:58139.D# [Count] [Linear] | 99.999 0.10                | 0.058 Flask Uncertainty<br>Purity Uncertainty As<br>(%) Purity (%) ( | 5E-05 Balance Uncertainty |  |                | Solvent:                                       | Certified  |
| 1 of 2                         | 250   |       | 150            |       | თ<br>O         |  | [Count] [Lin                          | 77.9 25.6744               | inty<br>Assay Target<br>(%) Weight (g)                               | ainty                     | (11)   | 2% 40.0        | Lot #<br>20370011                              | Certified Reference Material CRM $\mathcal{R}_{1} = \left[ \frac{1}{2} \right] \left[ \frac{1}{2} \right] \left[ \frac{1}{2} \right] \left[ \frac{1}{2} \right]$ |
|                                | 260   |       | 160            |       | 0              |  | ear]                                  | 25.6745                    | Actual Actual<br>) Weight (g) Conc. (µg/mL)                          |                           |  | Nitric Acid    | Nitric Acid                                    | aterial CRM  |
|                                |       |       | 170            |       | 70             |  |                                       | 10000.0                    |  | Re                        |  | Fo             | ]  |  |
|                                |       |       | 180            |       | 80             |  |                                       | 20.0 1314-36-9             | Expanded<br>Uncertainty (1<br>+/- (µg/mL) CAS#                       | Reviewed By:              | Herein   | Formulated By: | Ada  |  |
| Printed: 10/7/2                |       |       | 190            |       | 90             |  |                                       | 6-9 NA                     | Solvent<br>O   | Pedro L. Rentas           | ten  | Lawrence Barry | une B  |  |
| Printed: 10/7/2021, 2:18:04 PM |       |       | 200            |       | 100            |  |                                       |                            | <b>SDS Information</b><br>Safety Info. On Attached<br>SHA PEL (TWA)  | ntas                      | 81   | arry           | Vr.  | ANAB ISO<br>AR-1539 (<br>https://Abso  |
| PM                             | ×     |       |                |       |                |  |                                       | NAN                        | 0  | 052521                    |  | 052521         |  | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com   |
|                                |       |       |                |       |                | an data an |                                       | NA                         | NIST   |                           |  |                |  | adited<br>s.com  |

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



**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):

| <0.02  | Zr                      | <0.02   | Ti  | <0.02 | 12  | 20.02  | 90    | 7.0>     | 2    | 10.02    | 210  |            |            |       | de la constante de | And the other designs of the o |              |       | A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER OWNE |
|--|-------------------------|---|---|-------|-----|--------|-------|----------|------|----------|--|------------|------------|-------|--|--|--------------|-------|--|
| <0.02  | 211                     | 10.01   | 01  |       | 1   | 2      | 2     | 5        | 4    | 33       | N  | 2002       | Ph         | <0.02 | Au   | <0.02  | Cu           | 20.02 | B  |
| 3  | 7                       | 200   | 5   | c0 0> | 2   | <0.02  | Sm    | <0.02    | Pt   | <0.02    | Mo   | <0.02      | La         | 20.02 | G  | 70.02  | 5            | 10.01 | J !  |
| -  | Y                       | <0.02   | Tm  | <0.02 | Sr  | <0.02  | Ru    | <0.02    | 7    | 7.0>     | gu   | 101        |            | 0.01  | 2  | 202  | 5            | <0.02 | <u>R</u> .   |
| 20.02  | ID                      | 20.02   | 111   | 10.2  | 144 | 10.01  | 1     | 10.01    | , ;  | 3        | H,   | 5          | ជ          | 300   | <u>_</u>   | 40.02  | ç            | <0.01 | Be   |
|  | \$                      | 3   | ţ   | 5     | Ş   | 000    | R     | 2002     | Pd   | <0.02    | Mn   | <0.02      | Ir         | <0.02 | Gd   | 20.02  | S            | 20.02 | La   |
| <0.02  | <                       | <0.02   | П   | <0.02 | Ag  | <0.02  | Rh    | <0.02    | Os   | <0.01    | Mg   | <0.02      | III        | 10.02 |  | 0.01   | 2            |       | ជ  |
| <0.02  | 0                       | <0.02   | Je  | 20.02 | IC  | 10.02  | 20    | 10.02    | 110  | 10.01    | 1  | 3          | 5          | 502   | IJ   | c0 0>  | C.           | <0.2  | As   |
| 10.01  | : :                     |   | 4   | 3     | 2   | 3      | D     | 200      | Ş    | c0 0>    | In   | <0.02      | Ho         | <0.02 | q  | <0.2   | Ca           | 20.02 | 30   |
| ca h   | W                       | <0.02   | 4L  | 402   | Se  | <0.02  | P     | <0.02    | Z    | <0.02    | 5  | 20.02      | 111        | 10.02 | 5  |  | 2            | 5     | 7  |
| South and a second second second   | and a second            | 「「ない」というないである   |   |       |     |        |       |          |      |          |  | 222        | 1 311      | 20 02 | Dv   | 20.02  | Cd           | <0.02 | AI   |
|  | No. of Concession, name |   | and the second se |       |     |        |       |          |      |          | No. of Street, or Stre |            | Strate and |       | Constraints and  | and the second second  | State States |       |  |
|  |                         |   |   |       |     | Jd/mL) | 40 (L | by ICP-I | TION | verifica | clais  | I ACE IVIE |            |       |  |  |              |       | T  |
| A REAL PROPERTY AND A REAL |                         | And the second se | and the second se |       |     |        | 5     | 5        |      | Solin I  | +>   |            | _          |       |  |  |              |       |  |
|  |                         |   |   |       |     |        |       |          |      |          |  |            |            |       |  |  |              |       |  |

(T)= Target analyte

## Physical Characterization:

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

Son 1. All

Certified by:

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

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

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

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

Part # 58139 Lot # 052521

3



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.

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

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

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

### (B) BREAKAGE OR MISSING ITEMS

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

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

### (C) ANALYSIS OF SAMPLES

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: 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.



**ICSA** 

M5126

M5127

M5128

M5129

M5130

### Instructions for QATS Reference Material: ICP-AES ICS

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

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

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. 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 HNO<sub>3</sub>. 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. | "CERTIFIE |                  |                        | ERENCE CH               | IECK SAMPL<br>CSB-0710      | E ICP-AES IO           | CSA-1211,               |
|----------|-----------|------------------|------------------------|-------------------------|-----------------------------|------------------------|-------------------------|
| Element  | CRQL      | Part A<br>(µg/L) | Low<br>Limit<br>(µg/L) | High<br>Limit<br>(µg/L) | Part A<br>+Part B<br>(µg/L) | Low<br>Limit<br>(µg/L) | High<br>Limit<br>(µg/L) |
| AI       | 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.

| m/z-> | 1.0E6 | 2.0E6 | m/z-> | 1000 | 2000    | 1.0E5 | 2.0E5                                | 1. Ammonium molybdate (Mo) | Compound   | Volume show                             | NIST Tes                 | Recommended Storage:<br>Nominal Concentration (µg/mL): | Expire             | Part<br>Lot<br>Des                               | CERTIFIED WEIGHT REPORT: | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    |
|-------|-------|-------|-------|------|---------|-------|--------------------------------------|----------------------------|--|---|--------------------------|--|--------------------|--|--------------------------|--|
| 210   |       |       | 110   |      | đ       |       | [1] Spectrum No.1                    |                            | Nur  | vn below was o                          | <b>NIST Test Number:</b> | d Storage:<br>n (µg/mL):                               | Expiration Date:   | Part Number:<br>Lot Number:<br>Description:      |                          | s, Inc.  |
| 2     |       |       | 120   |      | N       |       | No.1                                 | 58142 022222               | Part Lot<br>Number Number  | Volume shown below was diluted to (mL): | <b>6UTB</b>              | Ambient (20 °C)<br>1000                                | 051725             | 57042<br>051722<br>Molybde                       |                          | -  |
|       |       |       |       |      |         |       | [ 8.594                              | 0.1000                     | Dilution<br>Factor   | 3000.41                                 |                          | 20 °C)   |                    | <u>57042</u><br><u>051722</u><br>Molybdenum (Mo) |                          |  |
|       |       |       | 130   |      | G       |       | sec]:5704                            | 300.0                      | Initial Un<br>Vol. (mL) Pip  | 0.058 Flas                              | 5E-05 Bala               |  |                    |  |                          | M.S.   |
|       |       |       | 140   |      | 40<br>0 |       | 8.594 sec]:57042.D# [Count] [Linear] | 0.084                      | Uncertainty N<br>Pipette (mL) Conc   | Flask Uncertainty                       | Balance Uncertainty      |  |                    | MKE  | _                        | Certified Rep<br>M.5192  |
|       |       |       | 150   |      | 50      |       | unt] [Líne                           | 1000                       | Nominal<br>Conc. (µg/mL) Co  |   |                          |  | 0.5%               | MKBQ8597V Am                                     | Lot #                    | ference M.   |
|       |       |       | 160   |      | 60      |       | )ar]                                 | 10001.0                    | Initial<br>Conc. (µg/mL) C   |   |                          |  | 15.0 ×             | Ammonium hydroxide                               |                          | Certified Reference Material CRM<br>いちいのえいたいのんりはてい                                       |
|       |       |       | 170   |      | 70      |       |                                      | 1000.0                     | Final<br>Conc. (µg/mL)   | Г                                       |                          |  | Ammonium hydroxide | æ  | -                        | M<br>172   |
|       |       |       |       |      |         |       |                                      | 2.1                        | Expanded<br>Uncertainty<br>+/- (µg/mL)   |   | Reviewed By:             | N's  | Formulated By:     | A  |                          |  |
|       |       |       | 180   |      | 80      |       |                                      | 13106-76-8                 | (Solve<br>CAS#   |   |                          | to I   |                    | deronce  |                          | •  |
|       |       |       | 190   |      | 90      |       |                                      | 5 mg(Mo)/m3                | SDS Information<br>nt Safety Info. On Attac<br>OSHA PEL (TWA)                      |   | Pedro L. Rentas          | era  | Lawrence Barry     | An   |                          | nt 、   |
|       |       |       | 200   |      | 100     |       |                                      | 13 orl-rat 333 mg/kg       | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50 |   | s 051722                 | /  | rry 051722         | Ψ  |                          | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |
|       |       |       |       |      |         |       |                                      | kg 3134                    | NIST   |   | 722                      |  | 722                |  |                          | 4 Accredite<br>ate Numbe<br>ndards.com   |

Part # 57042 Lot # 051722

1 of 2

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| vww.absc                  | 100-368-1  |
|---------------------------|------------|
| vww.absolutestandards.com | 0-368-1131 |
| com                       | rds, I     |
|                           | Inc        |



**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 M | letals | Verifica | ition | by ICP-N | IS (µ | g/mL) |    |       |    |       |     |  |
|----------|-------|----------|-------|-----|-------|-----|---------|--------|----------|-------|----------|-------|-------|----|-------|----|-------|-----|--|
| A        | <0.02 | ß        | 40.02 | Dv  | 20.02 | Ηŕ  | 3       | 1      | -        | 1     |          |       |       |    |       |    |       |     |  |
| SP<br>SP | A).02 | Ĵ,       | 2.0   | 7 5 | 10.02 | 1   | <0.02   | ' E    | 20.02    | N     | <0.02    | P     | <0.02 | Se | <0.2  | 4L | <0.02 | W   | <0.02  |
| <u>,</u> |       | <u>م</u> | 10.2  | 5   | 20.02 | Ho  | <0.02   | Lu     | <0.02    | ß     | <0.02    | Re    | <0.02 | Si | 40.02 | 5  | <0.02 | 11  | 4000   |
| 2        | 202   | ŝ        | 20.02 | E   | <0.02 | h   | <0.02   | Mg     | <0.01    | ò     | <007     | Rh    | 50    | ۸, | 2003  | 3  | 3     | : ( |  |
| Ba       | 40.02 | S        | <0.02 | 3   | 300   | 7   | 3       | ξ,     | 2        | 2     |          |       | 10.02 | 26 | 70.02 |    | 20.02 | <   | 20.02  |
| Be       | 5     | ?        | 3     | 2   | 20.02 | l = | 70.02   | UTAT   | 20.02    | Pd    | <0.02    | Rb    | <0.02 | Na | 40.2  | Ъ  | <0.02 | ΥЪ  | <0.02  |
| 2        | -     | 2        | 70.02 | Ca  | <0.02 | He  | <02     | Hg     | 40.2     | P     | <0.02    | Ru    | <0.02 | S  | 40.02 | J  | 300   | <   | 2003   |
| Id       | 20.02 | 6        | 40.02 | ଜ   | <0.02 | 5   | 40.02   | Mo     | ÷        | ¥     | 2003     | ŝ     | 202   | 0  | 5     | >  |       | 1,  | 10104  |
| ω        | 40.02 | 6        | <0.02 | An  | 3     | ş   | 3       | E      |          | ; ;   | TO'NE    | UH    | 70.02 | 0  | 20.05 | Sn | 20.02 | 5   | <0.02  |
|          |       |          |       |     | 10.01 | 0.1 | 20.05   | ING    | 20.02    | ~     | 40.2     | Sc    | <0.02 | Ta | <0.02 | Т  | <0.02 | 72  | <0.02  |
|          |       |          |       |     |       |     |         |        |          |       |          |       |       |    |       |    |       |     | And in the second secon |

(T)= Target analyte

### Physical Characterization:

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

Sor 1. 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 # 57042 Lot # 051722

| m/z-> | N.5E6 | m/z-><br>5.0E6 | 2.5E6 | m/z-><br>5.0E6 | N<br>5<br>11<br>5 | 5.0E5                                | 1. Sodium nitrate (Na) | Compound   | B00-368-1131         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 | Absolute Standards, Inc.  |
|-------|-------|----------------|-------|----------------|-------------------|--------------------------------------|------------------------|--|--|---------------------------|
| 210   |       | 1 10           |       | 10             |                   | [1] Spectrum No.1                    | INC                    | R  | itandards.com  | s, Inc.                   |
| 220   |       | 120            |       | NO             |                   | No.1                                 | IN036 NAV01201511      | Lot<br>RM# Number  | 58111<br>092121<br>Sodium (Na)<br>092124<br>Ambient (20 °C)<br>10000<br>6UTB<br>Iuted to (mL): 30  |                           |
| 230   | ä     | 130            |       | a<br>o         |                   | 8.935 sec                            | 10000 9                | Nominal F<br>Conc. (µg/mL)   | M /  |                           |
| 240   |       | 140            |       | 40             |                   | ]:58111.D#                           | 99.999 0.10            | Purity Uncertainty<br>(%) Purity (%)   | Certified Re<br>Solvent<br>2%<br>5E-05 Balance Uncertainty<br>0.058 Flask Uncertainty  |                           |
| 250   |       | 150            |       | თ<br>O         |                   | 8.935 sec]:58111.D# [Count] [Linear] | 27.0 111.1274          | Assay Target<br>(%) Weight (g)   | Certified Reference Material CRM   |                           |
| 260   |       | 160            |       | 0              |                   | near]                                | 74 111.1433            | t Actual<br>(g) Weight (g)   | Material CRI   |                           |
|       |       | 170            |       | 70             |                   |                                      |                        | Actual (<br>Conc. (µg/mL)  |  | )                         |
|       |       | 180            |       | 80             |                   |                                      | General Content        | Expanded<br>Uncertainty<br>+/- (µg/mL) C   | Formulated By:<br>Reviewed By:   |                           |
|       |       | 190            |       | 80             |                   |                                      | 7631-99-4 5            | Solvent Saf<br>CAS# OSH/   |  | D                         |
|       |       |                |       |                |                   |                                      | 5 mg/m3                | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LDS( | Giovanni Esposito  | ΔΝΔ                       |
|       |       | 00             |       | 100            |                   |                                      | orl-rat 3236 mg/kg     | <b>on</b><br>tached pg.)<br>LD50   | AR-1539 Certificate Number<br>https://Absolutestandards.com  | ANAR ISO 1703/ Accredited |
| - M   |       |                |       |                |                   |                                      | 0                      | NIST   |  | Annonliton                |

Part # 58111 Lot # 092121

1 of 2

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



**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 M | etals | Verifica | ition | by ICP-N | H) SI | g/mL)   |                     |       |  |       |    |       |
|----|-------|---|-------|----|-------|----|---------|-------|----------|-------|----------|-------|---|---------------------|-------|--|-------|----|-------|
|    | 200   |   |       |    |       |    |         |       |          |       |          |       |   |                     |       |  |       |    |       |
| A  | <0.02 | 8 | <0.02 | Dy | <0.02 | Hf | <0.02   | Li    | <0.02    | Ni    | <0.02    | Pr    | <0.02   | Se                  | 40.2  | 41   | 40.02 | W  | <0.02 |
| Sb | <0.02 | G | <0.2  | 막  | <0.02 | Но | <0.02   | Ľ     | <0.02    | Nb    | <0.02    | Re    | <0.02   | S                   | <0.02 | Te   | <0.02 | C  | <0.02 |
| As | <0.2  | S | <0.02 | Eu | <0.02 | In | <0.02   | Mg    | <0.01    | SO    | <0.02    | Rh    | <0.02   | Ag                  | <0.02 | Н  | <0.02 | V  | <0.02 |
| Ba | <0.02 | S | <0.02 | Gd | <0.02 | ١٢ | <0.02   | Mn    | <0.02    | Pd    | <0.02    | Rb    | <0.02   | Na                  | T     | Ц  | <0.02 | YЪ | <0.02 |
| Be | <0.01 | ç | <0.02 | Ga | <0.02 | Fe | <0.2    | Hg    | <0.2     | P     | <0.02    | Ru    | <0.02   | Sr                  | <0.02 | Tm   | <0.02 | Y  | <0.02 |
| Bi | <0.02 | S | <0.02 | Ge | <0.02 | La | <0.02   | Mo    | <0.02    | Pt    | <0.02    | Sm    | <0.02   | s                   | <0.02 | Sn   | <0.02 | Z  | <0.02 |
| u. | <0.02 | 6 | <0.02 | Au | <0.02 | Рb | <0.02   | Nd    | <0.02    | ĸ     | <0.2     | Sc    | <0.02   | Ta                  | <0.02 | Ti   | <0.02 | Zr | <0.02 |
|    |       |   |       |    |       |    |         |       |          |       |          |       | and the second se | State of the second |       | Contraction of the local division of the loc |       |    |       |

Physical Characterization:

(T)= Target analyte

Certified by:

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

She for the

\* 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 # 58111 Lot # 092121



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.

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (A) SAMPLE DESCRIPTION

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

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

### (B) BREAKAGE OR MISSING ITEMS

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

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

### (C) ANALYSIS OF SAMPLES

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: 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.



**ICSA** 

M5126

M5127

M5128

M5129

M5130

### Instructions for QATS Reference Material: ICP-AES ICS

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

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

**ICSA-1211, Interferents:** Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO<sub>3</sub>. 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 HNO<sub>3</sub>. 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. | "CERTIFIE |                  |                        | ERENCE CH               | IECK SAMPL<br>CSB-0710      | E ICP-AES IO           | CSA-1211,               |
|----------|-----------|------------------|------------------------|-------------------------|-----------------------------|------------------------|-------------------------|
| Element  | CRQL      | Part A<br>(µg/L) | Low<br>Limit<br>(µg/L) | High<br>Limit<br>(µg/L) | Part A<br>+Part B<br>(µg/L) | Low<br>Limit<br>(µg/L) | High<br>Limit<br>(µg/L) |
| AI       | 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.

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com          |   | •                                       |                            | Certifie                           | Certified Reference Material CRM                  | e Materia                             | I CRM           |                 |                                       |             |   | AR-1<br>https:///    | AR-1539 Certificate Number<br>https://Absolutestandards.com | standar     |
|--|---|---|----------------------------|------------------------------------|---|---------------------------------------|-----------------|-----------------|---------------------------------------|-------------|---|----------------------|---|-------------|
| <u>CERTIFIED WEIGHT REPORT:</u><br>Part Number:<br>Lot Number:<br>Description: | <u>57051</u><br><u>101521</u><br>Antimo | <u>57051</u><br>101521<br>Antimony (Sb) |                            |                                    | <b>Lot</b> #<br>20370011                          | Solvent:<br>1 Nitric Acid             | ci<br>Tt:       |                 | Giovannie                             |             | Espe  | posite               |   |             |
|  |   |   |                            |                                    | 2.0%  | 40.0                                  |                 | Nitric Acid For | Formulated By:                        |             | Giovanni Esposito   | sposito              |   | 101521      |
| Expiration Date:   | 101524<br>Amhient                       | 4<br>nt (20 °C)                         |                            |                                    |   | (mL)                                  |                 |                 |                                       | ,           |   |                      |   |             |
| Nominal Concentration (µg/mL):   | 1000                                    |   |                            |                                    |   |                                       |                 |                 | X                                     | \$.<br>\$.  | ten   | ð                    |   |             |
| NIST Test Number:  | 6UTB                                    |   | 5E-05                      | 35 Balance Uncertainty             | ncertainty  |                                       |                 | Re              | Reviewed By:                          |             | Pedro L. Rentas   | Rentas               |   | 101521      |
| Volume shown below was diluted to (mL):  | diluted to (r                           | <b>nL):</b> 2000.25                     | .25 0.116                  | 6 Flask Uncertainty                | ərtainty  |                                       |                 | _ [             | Expanded                              |             | SDS I   | SDS Information      |   |             |
| Compound   | Part Lot<br>Number Number               | : Dilution<br>Factor                    | on Initial<br>or Vol. (mL) | al Uncertainty<br>mL) Pipette (mL) | Uncertainty Nominal<br>Pipette (mL) Conc. (ug/mL) | Initial<br>Conc. (µa/mL               | Conc            |                 | Uncertainty<br>+/- (µɑ/mL)            | (So<br>CAS# | (Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50 | nfo. On Att<br>(TWA) | ached pg.)<br>LD50  | NIST<br>SRM |
| b)   |   |   |                            | .0 0.084                           | 1000  |                                       |                 |                 | 2.2                                   | 7440-36-0   | 0.5 ma/m3   |                      | orl-rat 7000 ma/ka  |             |
| Ν. Φ.<br>Φ. Ο<br>Π. Π.<br>Φ. Δ.  |   |   |                            |                                    |   | 17.964 sec]:58051.D# [Count] [Linear] |                 |                 |                                       |             |   |                      |   |             |
| m/z-> 10   |   |   |                            |                                    |   | [Linear]                              |                 |                 |                                       |             |   |                      |   |             |
|  |   | 20                                      | ω <u>-</u>                 | 4-<br>0                            | <u>ต</u><br>0                                     | Cinear                                | 6 <u>.</u>      | 70              | 'n                                    | 80<br>O     | <u>8</u>  | -                    | 100   |             |
| 5.0E5<br>-   |   |   | ω.<br>Ο                    | 4                                  | м.  | Cinear<br>ar                          | 0<br>0          | 70              | m                                     | Ö           | ğ   |                      | ŏ   |             |
| 2.5 0<br>E E5<br>  | N                                       | Ö                                       | β                          | 4.<br>0                            | м.<br>М   |                                       | 6 <u>0</u><br>0 | 70              | n n n n n n n n n n n n n n n n n n n | Ö           | ø.  |                      | Ğ'  |             |
| 5.0E5<br>2.5E5<br>m/z-><br>2.0E7   |   |   | 1<br>30                    | 140 <sup>4</sup>                   | 15-0<br>0   |                                       | 160<br>0        | 170             |                                       | 180         | 190<br>0  |                      |   |             |
|  |   |   | 30<br>0                    | 4-<br>6-                           | ซ. ซ.   |                                       | 8               | 6               | -<br>                                 |             | e<br>B  |                      | ŏ' ŏ'   |             |





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

| в     | Bi    | Be            | Ba    | As    | Sp    | AI    |          |       |
|-------|-------|---------------|-------|-------|-------|-------|----------|-------|
| 4     |       |               |       |       |       |       |          |       |
| 0.02  | <0.02 | 0.01          | 0.02  | 0.2   | Т     | <0.02 |          |       |
| Cu    | Co    | Ω             | Cs    | Ce    | $C_a$ | Cd    |          |       |
| <0.02 | <0.02 | <0.02         | <0.02 | <0.02 | <0.2  | <0.02 |          |       |
| Au    | Ge    | Ga            | Gd    | Eu    | Er    | Dy    |          |       |
| <0.02 | <0.02 | <0.02         | <0.02 | <0.02 | <0.02 | <0.02 |          |       |
| Рь    | La    | Fe            | lr    | In    | Ho    | Hf    |          |       |
| <0.02 | <0.02 | <0.2          | <0.02 | <0.02 | <0.02 | <0.02 | Irace M  |       |
| Nd    | Mo    | Hg            | Mn    | Mg    | Lu    | Li    | recais   | ) - ) |
| <0.02 | <0.02 | <0.2          | <0.02 | <0.01 | <0.02 | <0.02 | Verifica |       |
| K     | Pt    | Р             | Pd    | Os    | Nb    | Ni    | uon i    |       |
| <0.2  | <0.02 | <0.02         | <0.02 | <0.02 | <0.02 | <0.02 | JY ICP-N |       |
| Sc    | Sm    | Ru            | Rb    | Rh    | Re    | Pr    |          |       |
| <0.02 | <0.02 | <0.02         | <0.02 | <0.02 | <0.02 | <0.02 | 3/ ML)   |       |
| Та    | s     | $\mathbf{Sr}$ | Na    | Ag    | Si    | Se    |          |       |
| <0.02 | <0.02 | <0.02         | <0.2  | <0.02 | <0.02 | <0.2  |          |       |
| Ti    | Sn    | Tm            | Th    | T     | Te    | Ть    |          |       |
| <0.02 | <0.02 | <0.02         | <0.02 | <0.02 | <0.02 | <0.02 |          |       |
| Zr    | Zn    | Y             | Yb    | V     | С     | 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.

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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).

| OCERTIFIED WEIGHT REPORT:         CERTIFIED WEIGHT REPORT:         CERTIFIED WEIGHT REPORT:         Part Number:         Lot Number:         Lot Number:         Lot Number:         Valuadium         Description:         Valuadium         Notional Concentration (ug/mL):         Notional Concentration (ug/mL):         Volume chorent chorent chorent chorent colspan= | 57023                            |          | č                 | of Deliver                               | 1                             | CO Joinetek                      |                        |  | 4              | AP   | ANAB ISO 17034 Accredited                                   | Accredited            |
|---|----------------------------------|----------|-------------------|--|-------------------------------|----------------------------------|------------------------|--|----------------|--|---|-----------------------|
| CERTIFIED WEIGHT REPORT:<br>Part Number:<br>Lot Number:<br>Description:<br>Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Test Number:  | 57023                            |          | C.                | runea He                                 | terence l                     | Certified Reference Material CHM |                        | EF)                                    |                | http:  | AR-1539 Certificate Number<br>https://Absolutestandards.com | te Numbe<br>dards.com |
| Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Test Number:<br>Volume shown bolow wee   | <u>100121</u><br>Vanadium (V)    | s        |                   | 5  | Lot #<br>20370011             | Solvent:<br>Nitric Acid          | L                      | Hierannie                              | nni E          | aperto   |   |                       |
| Nominal Concentration (Jg/mL):<br>NIST Test Number:<br>Volume shown holow was   | 100124<br>Ambient (20 °C)        | 1 0      |                   |  | 2.0%                          | 60.0<br>(mL)                     | Nitric Acid            | Formulated By:                         | 4              | Giovanni Esposito  | 100121  |                       |
| A DIALITE SHOWIN DELOW WAS  | 6UTB<br>6UTB<br>diluted to (mL): | 3000.4   | 5E-05 B<br>0.06 F | Balance Uncertainty<br>Flask Uncertainty | ×                             |                                  |                        | Reviewed By:                           |                | Pedro L. Rentas  | 100121  |                       |
| Compound  | Part Lot<br>Number Number        |          |                   | Uncertainty<br>Pipette (mL) Co           | ν<br>Nominal<br>Conc. (μg/mL) | Initial<br>Conc. (µg/mL)         | Final<br>Conc. (µg/mL) | Expanded<br>Uncertainty<br>+/- (µg/mL) | (Solve<br>CAS# | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50 | <b>ation</b><br>Attached pg.)<br>LD50                       | NIST                  |
| 1. Ammonium Metavanadate (V) 58   | 58123 070721                     | 0.1000   | 300.0             | 0.084                                    | 1000                          |                                  | 1000.0                 | 2.1                                    | 7803-55-6      | 1.0 mg/m3  | orl-rat 630 mg/kg   | 3165                  |
| 2.0E6   | -                                | 4.243 se | c]:5802           | 34.243 sec]:58023.D# [Count] [Linear]    | Inne ILL                      | iear]                            | ۵.                     |  |                |  |   |                       |
| 1.0E6-  |                                  |          |                   |  |                               |                                  |                        |  |                |  |   |                       |
| m/2-> 10  | 20                               | 0        |                   | 40                                       | 20                            | 80                               | 20                     | W                                      | 08             | 06   | 100   |                       |
| 1.0E  |                                  |          |                   |  |                               |                                  |                        |  |                |  |   |                       |
| m/z->   | 120                              | 130      |                   | 140                                      | 150                           | 160                              | 170                    |  | 180            | 190  | 200   |                       |
| а<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8<br>8  |                                  |          |                   |  |                               |                                  |                        |  |                |  |   |                       |
| m/z-> 210   | 220                              | 230      |                   | 240                                      | 250                           | 260                              |                        |  |                |  |   |                       |

Part # 57023 Lot # 100121

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

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

|    |       |    |       |    |       |    | Trace N   | Aetals | S Verification by | tion     | by ICP-M | IS (U | g/mL) |      | and the second second |      |                     |    |  |
|----|-------|----|-------|----|-------|----|---|--------|-------------------|----------|----------|-------|-------|------|-----------------------|------|---------------------|----|--|
|    |       |    |       |    |       |    |   |        |                   |          |          |       |       |      |                       |      | Sam Providence - An |    | A lot of the subscription of the subscription of |
| _  | <0.02 | Cd | <0.02 | Dy | <0.02 | JH | <0.02   | L:     | <0.02             | ï        | <0.02    | Pr    | <0.02 | Se   | <0.2                  | Tb   | <0.02               | M  | <0.02  |
| ~  | <0.02 | Ca | <0.2  | Er | <0.02 | Ho | <0.02   | Lu     | <0.02             | ЧN       | <0.02    | Re    | <0.02 | Si   | <0.02                 | Te   | <0.02               | n  | <0.02  |
|    | <0.2  | ပိ | <0.02 | Eu | <0.02 | In | <0.02   | Mg     | <0.01             | Os       | <0.02    | Rh    | <0.02 | Ag   | <0.02                 | IT   | <0.02               | >  | F  |
| _  | <0.02 | Cs | <0.02 | Gd | <0.02 | Ц  | <0.02   | Mn     | <0.02             | Pd       | <0.02    | Rb    | <0.02 | Na   | <0.2                  | Th   | <0.02               | ΥР | cu u>  |
|    | <0.01 | ŋ  | <0.02 | Ga | <0.02 | Fe | <0.2  | Hg     | <0.2              | Д        | <0.02    | Ru    | <0.02 | Sr   | <0.02                 | Tm   | <0.02               | 2  | 20.02  |
| Bi | <0.02 | Co | <0.02 | Ge | <0.02 | La | <0.02   | Mo     | <0.02             | Ł        | <0.02    | Sm    | <0.02 | s    | <0.02                 | Sn S | 20.02               | 7" | 70.02  |
|    | <0.02 | Cu | <0.02 | Au | <0.02 | Pb | <0.02   | PN     | <0.02             | Х        | <0.2     | Sc    | <0.02 | , Ta | <0.02                 | Ę    | 20.02               | 7, | 20.02  |
|    |       |    |       |    |       |    | and the second se |        |                   |          |          |       |       |      | 70.00                 |      | 70.02               | 77 | 20.02  |
|    |       |    |       |    |       |    |   |        | Toract            |          |          |       |       |      |                       |      |                     |    |  |
|    |       |    |       |    |       |    |   |        | (1)= Idiger       | allalyle |          |       |       |      |                       |      |                     |    |  |

### **Physical Characterization:**

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

Certified by:

Sar 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.

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

| m/z->        | 1.067 | m/z-><br>2.0E7 | N<br>.01<br>11<br>01 | 5.0百万           | N.<br>01<br>01<br>01 | 5.0ES                                 | 1. Antimony (Sb) | Compound   | NIST Te<br>Volume shc   | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL): | Contractory Mercons nervors:<br>Lo<br>De    | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    |
|--------------|-------|----------------|----------------------|-----------------|----------------------|---------------------------------------|------------------|--|---|--|---|--|
| 1210         |       | 110            |                      | 1.              |                      | [1] Spectrum No.1                     | 58               | Nup  | NIST Test Number:<br>ume shown below was                          | Expiration Date:<br>nended Storage:<br>ntration (µg/mL):                   | Part Number:<br>Lot Number:<br>Description: | ∃ s, Inc.  |
| NNO          |       | 120            |                      | N.<br>O         |                      | -                                     | 58151 061021     | Part Lot<br>Number Number  | NIST Test Number: 6UTB<br>Volume shown below was diluted to (mL): | 051825<br>Ambient (20 °C)<br><b>1000</b>                                   | 57051<br>051822<br>Antimony (Sb)            | \$   |
| N<br>30<br>0 |       | 130            |                      | <u>u</u><br>0   |                      | 17.964 sec]                           | 0.1000 30        | Dilution Ir<br>Factor Vol  | 3000.41 0.  | °C)  | (dS)  | R  |
| 240          |       | 140            |                      | <u>4</u>        |                      | 17.964 sec]:58051.D# [Count] [Linear] | 300.0 0.084      | Initial Uncertainty Nominal<br>Vol. (mL) Pipette (mL) Conc. (µg/mL)                | 5E-05 Balance Uncertainty<br>0.058 Flask Uncertainty              |  |   | 0.9  |
| N<br>G<br>O  |       | 150            |                      | 50              |                      | Count] [Line                          | 1000             |  | tainty<br>Ny  | 2.0%   | unde<br>unde                                | ference M  |
| 2<br>0       |       | 100            |                      | 8 <u>.</u><br>0 |                      |                                       |                  | Initial<br>Conc. (µg/mL) Conc  |   | 60.0 Nit<br>(mL)   | Solvent:<br>Nitric Acid                     | aterial CRM  |
|              |       | 170            |                      | 70              |                      |                                       |                  | Expanded<br>Final Uncertainty<br>Conc. (µg/mL) +/- (µg/mL)                         | Reviewed By:  | Nitric Acid Formulated By:   | J.C.  |  |
|              |       | 180            |                      | 80              |                      |                                       | 7440-36-0        | CAS  | ad By:  | ated By:   | haranni                                     | -  |
|              |       | 190            |                      | ů<br>O          |                      |                                       |                  | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50 | Pedro L. Rentas   | Giovanni Esposito  | Esposite                                    | htt  |
|              |       | 200            |                      | 100             |                      |                                       |                  | <b>mation</b><br>On Attached pg.)<br>A) LDSO                                       | as 051822   | la 051822  | V.  | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |
|              |       |                |                      |                 |                      |                                       |                  | NIST   | 322   | 322  |   | Accredited<br>ate Number<br>ndards.com   |

Part # 57051 Lot # 051822

1 of 2

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**Certified Reference Material CRM** 



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

| 2                   | B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B  |          |
|---------------------|--|----------|
|                     | 40.2<br>40.2<br>40.2<br>5<br>40.2<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5<br>5   |          |
|                     | 5 S C C C C S S  |          |
|                     | 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6  |          |
|                     | ନ୍ଦୁ କୁ କୁ ଅନ୍ତୁ<br>କୁ କୁ କୁ ସୁ  |          |
|                     | 8 8 8 8 8 8 8<br>8 8 8 8 8 8 8<br>8 8 8 8 8 8  |          |
|                     | 88<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15<br>15   |          |
|                     | 8 8 8 8 8 8<br>8 8 8 8<br>8 8 8 8<br>8 8 8<br>8 8<br>8   | Trace M  |
|                     | Hg Hg Nd   | etals    |
| (T)= Target analyte | 40.02<br>40.02<br>40.02<br>40.02<br>40.02<br>40.02   | Verifics |
| analyte             | × 7 P S S N  | in       |
|                     |  |          |
|                     | Rb<br>Sm<br>Sc   |          |
|                     | 9/mL)  |          |
| ŀ                   | To St N & Si Se  |          |
|                     |  |          |
| L                   |  |          |
|                     | 2 S I J J J J J  |          |
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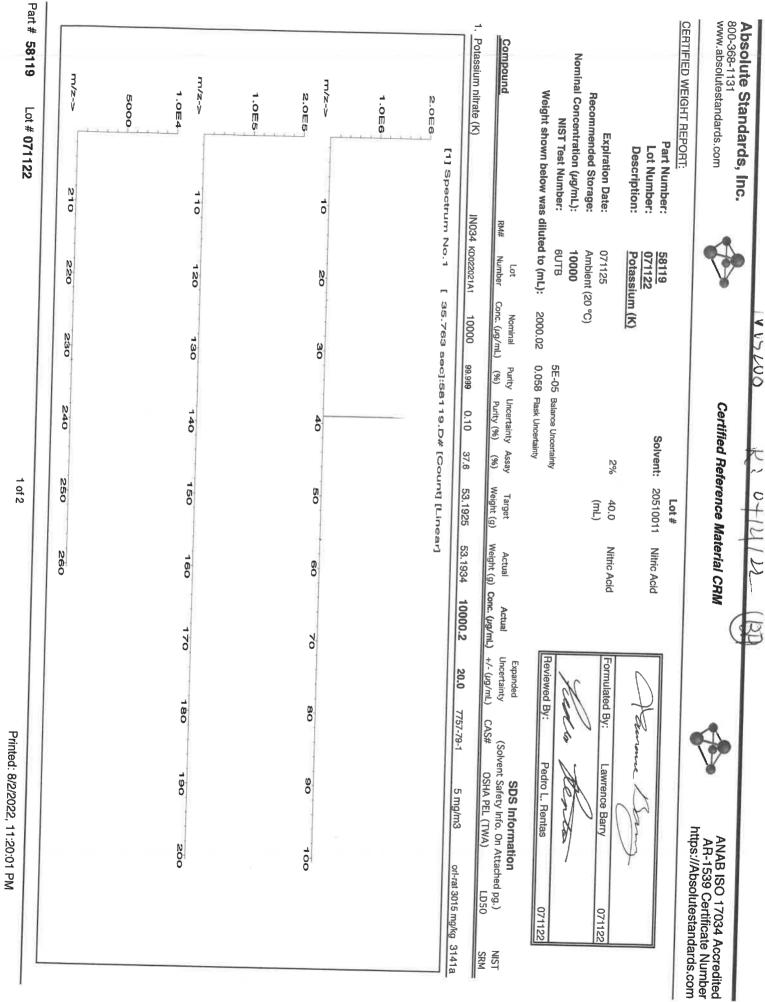
Physical Characterization:

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

**Certified by:** 

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

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



1 of 2

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com  | Certified Reference Material CRM   | *              | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |
|--|--|----------------|--|
| Instrumental Analysis by Indu  | Mass Spec  |                |  |
| <0.02  | Trace Metals V   |                |  |
| 40.02     40.02       40.02     Ca       40.02     Ca | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$   | <0.2           | W         <0.02  |
| Physical Characterization:   | (T)= Target analyte  |                | 1 10.02  |
| Homogeneity: No heterogeneity was ob   | Homogeneity: No heterogeneity was observed in the preparation of this standard.  | Ce             | Certified by:  |
|  |  | ( )            | sold and a   |
|  | The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in All standard containers are meticulously cleaned prior to use   | ated.<br>ed in |  |
| <ul> <li>Standards are prepared gravimetriculously cleaned prior to use.</li> <li>Standards are certifed (+/-) 0.5% of the stated value, unless</li> <li>All standards should be stored with caps tight and under apping the uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelin Measurement Result," NIST Technical Note 1297, U.S. Govern</li> </ul>                        | Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).<br>Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.<br>All standards should be stored with caps tight and under appropriate laboratory conditions.<br>Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST<br>Measurement Result." NIST Technical Note 1305   |                |  |
|  | This is the second |                |  |
|  | D.C. (1994).   |                |  |



1 of 2

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|--------------|------------------------|
|              | Inc.                   |
|              | 800-368-1131           |



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

|    |       |                |       |    |       |    | race Me | etais | Verifica | ation | by ICP- | MC ( | hg/mr) |    |       |    |       |                |             |
|----|-------|----------------|-------|----|-------|----|---------|-------|----------|-------|---------|------|--------|----|-------|----|-------|----------------|-------------|
|    |       |                |       |    |       |    | -0110-  |       |          |       |         |      |        |    |       |    |       |                |             |
| Al | Т     | G              | <0.02 | Dy | <0.02 | Hf | <0.02   | Li    | <0.02    | Ni    | <0.02   | 77   | <0.02  | Se | <0.2  | Ъ  | <0.02 | W              | <u>6</u> .0 |
| Sр | <0.02 | ß              | <0.2  | 막  | <0.02 | Но | <0.02   | Ŀ     | <0.02    | Nb    | <0.02   | Re   | <0.02  | ŝ  | <0.02 | Te | 40.02 |                | <0.02       |
| As | <0.2  | င့             | <0.02 | Eu | <0.02 | In | <0.02   | Mg    | <0.01    | ŝ     | <0.02   | Rh   | <0.02  | Ag | <0.02 |    | 40.02 | V              | 4           |
| Ba | <0.02 | ß              | <0.02 | Gd | <0.02 | ١r | <0.02   | Mn    | <0.02    | Pd    | <0.02   | Rb   | <0.02  | Na | <0.2  | Þ  | <0.02 | Υ <del>γ</del> | 4           |
| Be | <0.01 | Ω              | <0.02 | Ga | <0.02 | Fe | <0.2    | Hg    | <0.2     | P     | <0.02   | Ru   | <0.02  | ş  | 40.02 | Jm | 40.02 | ¥              |             |
| B: | <0.02 | S              | <0.02 | Ge | <0.02 | La | <0.02   | Mo    | <0.02    | ₽     | <0.02   | Sm   | <0.02  | s  | <0.02 | 2  | <0.02 | 7              | ~           |
| B  | <0.02 | С <sup>1</sup> | <0.02 | Au | <0.02 | Pb | <0.02   | Nd    | <0.02    | ×     | <0.2    | Ş    | <0.02  | Ta | <0.02 | Ţ. | <0.02 | 27             | A)          |

### Physical Characterization:

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

(T)= Target analyte

Certified by:

In P. Mr.

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

the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

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

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

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



QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program" R : 以120 2 [

Instructions for QATS Reference Material: Inorganic ICV Solutions

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

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

- APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.
  - **<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"

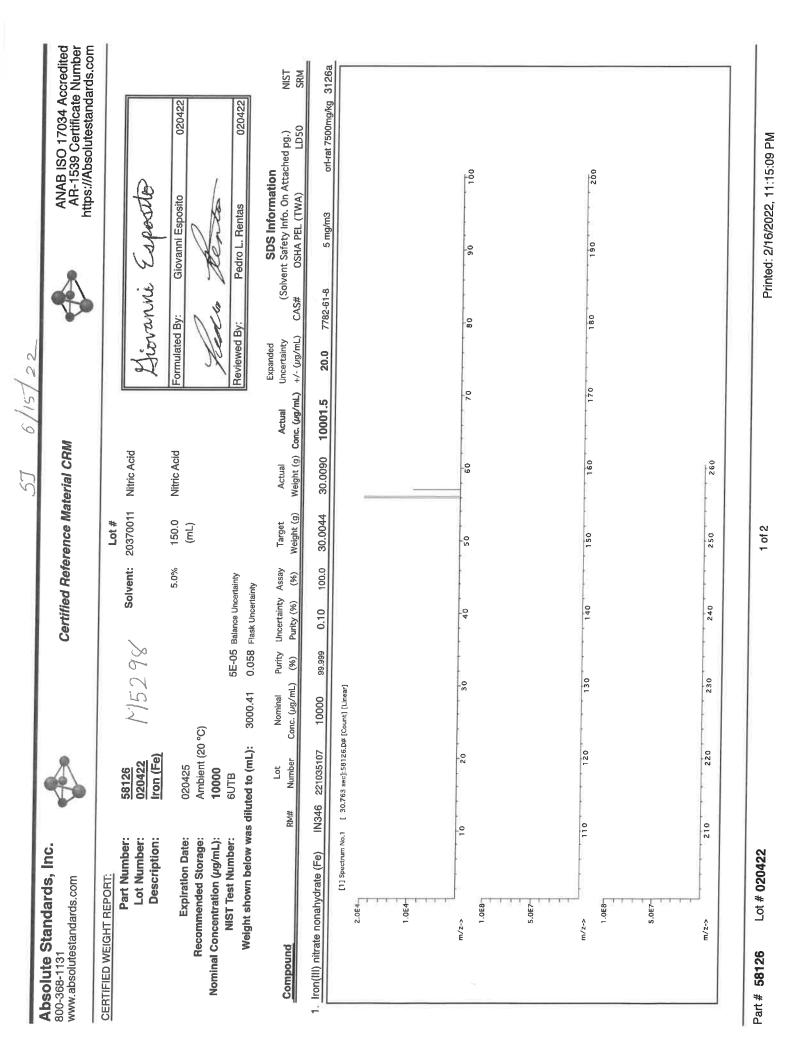
AP11MInstructions for QATS Reference Material: Inorganic ICV SolutionsICV1-1014For ICP-MS analysis, use a 50-fold dilution by pipetting 2 mL of the ICV1 concentrate<br/>into a 100 mL volumetric flask and dilute to volume with 1% (v/v) nitric acid.ICV5-0415For the cold vapor analysis of mercury by AA, use a 100-fold dilution by pipetting<br/>1 mL of the ICV5 concentrate into a 100 mL volumetric flask and dilute to volume<br/>with 2% (v/v) nitric acid. The ICV5 concentrate is prepared in 0.05% (w/v) K2Cr2O7<br/>and 5% (v/v) nitric acid.ICV6-0400For the analysis of cyanide, use a 100-fold dilution by pipetting 1 mL of the ICV6<br/>concentrate into a 100 mL volumetric flask and dilute to volume with Type II water.<br/>Distill this solution along with the samples before analysis. The cyanide concentrate<br/>is prepared from K3Fe(CN)6, Type II water, and 0.1 % sodium hydroxide, and will<br/>decompose rapidly if exposed to light.

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

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

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

|         | ICV5-0415   |                 | ICV6-0400   |
|---------|---|-----------------|---|
| Element | Concentration (µg/L)<br>(after 100-fold dilution) | Analyte         | Concentration (µg/L)<br>(after 100-fold dilution) |
| Hg      | 4.0   | CN <sup>.</sup> | 99  |



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

| 000   | 20 | 00.00 |    |       |    |       |      |       |          |       | ALC: NO | LI LI LI LI LI LI |          | The state of the |    |       |        |       |
|-------|----|-------|----|-------|----|-------|------|-------|----------|-------|---------|-------------------|----------|------------------|----|-------|--------|-------|
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| <0.02 | S  | <0.2  | ц, | 2002  | ЦО | 000   | F    |       | ; ;      |       | * *     | 70.02             | b<br>o   | 2.0>             | 19 | <0.02 | >      | <0.0× |
| 507   | c  | 0.00  | i, | 10.04 | 2  | 70.02 | T'I  | <0.02 | ٩Ż       | <0.02 | Re      | <0.02             | 55       | <0.02            | ť  | 2007  | 11     | 001   |
| 7.02  | ŋ  | <0.02 | 립  | <0.02 | In | <0.02 | Mo   | /0.01 | ć        | 000   | ē       |                   |          |                  | 2  | 10.02 | >      | 20.02 |
| <0.02 | ڒ  | 20.02 | 2  | 000   |    |       | 9    | 10.04 | ŝ        | 70.02 | 2       | <0.02             | Ag       | <0.02            | Ħ  | ≤0.02 | >      | <0.0> |
|       | 3  | 70.04 | 3  | <0.UZ | 4  | <0.02 | Mn   | <0.10 | Ρd       | <0.02 | Rh      | <0.02             | ٩Ŋ       | 102              | É  | 200   |        |       |
| <0.01 | გ  | <0.5  | g  | <0.02 | Ц. | C 02  | 'n,  |       | ¢        |       | 1       | 1000              | PLT      | 7.02             | 97 | <0.02 | Υb     | <0.0≻ |
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| 70.02 | 3  | 01.02 | 35 | <0.10 | ę  | <0.02 | мо   | <0.02 | Ł        | <0.02 | mS.     | 2007              | U        | 200              | 5  |       | ۰ I    | 20.00 |
| <0.02 | õ  | <0.10 | Υn | <0.02 | fd | <0.02 | NA   | 20.02 | 1        |       | 5       | 70.02             | 2        | 20.02            | Ч  | <0.02 | Z<br>Z | ×0.0  |
|       |    |       |    |       |    |       | DLT  | 20.02 | 4        | 202   | 22      | <0.02             | <u>e</u> | 000              | ï  | 2007  | 1      | ç     |

Physical Characterization:

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

Certified by:

Sur P

- \* 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).

| 1 023 Multed to (<br>2 072 1<br>1000 1000 1000 1000 1000 1000 1000 1   |
|--|
| Expiration Dete:         072125         2%         40.0         Nithic Add           neradid Storage:         Ambient (20 °C)         SE-05 Baaroe Uncertainty         (mL)         Nithic Add           ST Test Number         GUTB         SE-05 Baaroe Uncertainty         SE-05 Baaroe Uncertainty         Actual         Number         Actual  |
| NIST fest Number:         6UTB         SE-05         Bance Unordary           Lot         Nominal         Purity Uncertainty Assy         Taget         Actual           Bance Intrate (Ba)         IN023 excame         1000         99.99         0.10         E23         3.82417         3.82426           1:0E8         [1]         Spectrum No.1         [1]         12.514         sec):69156.0/f         [Count] [Linear]           2:0E8         11.0E8         11.0E8         1         20         30         40         50         60           2:0E8         10         120         130         140         150         160         50  |
| Compound         New         Number         Core:         (up/m.)         (%)         Parity (%)         (%)         Weight (0)         Weight (0) |
| [1] Spectrum No.1 [ 12.514 sec]:58156.D# [Count] [Linear]<br>E8<br>E5<br>E5<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6<br>E6  |
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# Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

|        |   |     |       |    | Children - |    |       |       |       |     |       |     |       | a the second sec |       |    |       |            |              |
|--------|---|-----|-------|----|------------|----|-------|-------|-------|-----|-------|-----|-------|--|-------|----|-------|------------|--------------|
| <0.02  |   | p,  | <0.02 | Dy | <0.02      | Hf | <0.02 | E     | <0.02 | ž   | <0.02 | Ŀ   | 000   | 100  | c 07  |    | W V   | 1 111      | 0000         |
| \$0.0P |   | Ğ   | <0.2  | 눱  | <0.02      | Ho | <0.02 | Lu    | <0.02 | ęz. | <0.02 | - d | 2007  | 3 0  | 1 200 | 2  | 20.02 | A :        |              |
| 02     |   | ,ei | <0.02 | Бu | <0.02      | ŗ  | <0.07 | ŷ     | 1002  | č   | 000   | 24  | 10.0  | 5  | 70.02 | 5  | 20.05 | 2          | <b>40.02</b> |
| F      | _ | 0   | 000   | 3  |            |    | 1010  | 9.1   | TO'O' | ŝi  | 70.02 | 2   | 70.02 | A0   | <0.02 | F  | <0.02 | >          | <u>6.02</u>  |
| + .    | - | 3   | 70'N2 | 3  |            | 늭  | <0.02 | MN    | <0.02 | Ъ   | <0.02 | RЪ  | <0.02 | Na   | 40.2  | Ē  | <0 UD | 42         | 0007         |
| 0.0    |   | 1   | <0.02 | Ga | <0.02      | Че | <0.2  | Hg    | <0.2  | ۵.  | <0.02 | Ru  | <0.02 | 2  | 007   | ł  |       | ; >        | 1000         |
| 20.0>  |   | 0   | <0.02 | e  | <0.02      | La | <0.02 | Mo    | <0.02 | å   | 2007  |     |       | 5 0  |       |    | 70.02 | -          | 20.02        |
| <0.02  | 1 | jă, | <0.02 | An | 000        | á  | 2007  | PIN I |       | : > | 20.00 |     | 70.02 | 0  | 70'02 | 10 | <0.U2 | <b>U</b> 7 | <0.02        |
|        | 1 |     |       | mL | TRA        | 2  | 20.02 | DNT   | ZUNZ  | 2   | 202   | ŝ   | <0.02 | E  | <0.02 | i  | 2002  | 7,         | 2007         |

## Physical Characterization:

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

Certified by:

ar R

- \* 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).

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

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

|    |       |    |       |    |       |      |       |         |       |    |       | and the second se | and |     | The state of the s |        |       |     |       |
|----|-------|----|-------|----|-------|------|-------|---------|-------|----|-------|---|---|-----|--|--------|-------|-----|-------|
| -  | <0.02 | 3  | <0.02 | Dy | <0.02 | Hf   | <0.02 | E       | Ŧ     | N  | <0.02 | 占   | <0.02                                   | Se  | ₫02  | e.     | <0.02 | M   | 000>  |
| Sb | <0.02 | లి | ⊲0.2  | Ъ  | <0.02 | Ho   | <0.02 | La<br>L | ≤0.0≥ | ź  | ≤0:0> | Re  | <0.0>                                   | 3   | €0.02  | e<br>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 | 4    | 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  | 000   | , 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.
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- \* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994). All Standards should be stored with caps tight and under appropriate laboratory conditions.

Lot # 070622 Part # 57103

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com | •                              | NA KAQ/L Certified Reference Material | Certified Re                   | erence Ma        | terial CRM                  |                 | >                       |                                | ANAE<br>AR-1  | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number | Accredit<br>te Numb |
|---|--------------------------------|---------------------------------------|--------------------------------|------------------|-----------------------------|-----------------|-------------------------|--------------------------------|---|---|---------------------|
| CERTIFIED WEIGHT REPORT:  |                                |                                       |                                | Lot #            | Solvent:                    | Vent 10         | 44                      | (                              |   |   |                     |
| Part Number:<br>Lot Number:<br>Description:                           | 57028<br>011223<br>Nickel (Ni) |                                       |                                | 20510011 N       | Nitric Acid                 |                 | Giovanni                |                                | Especto   |   |                     |
| Expiration Date:  | 011226                         |                                       |                                | 2.0%             |                             | Nitric Acid For | Formulated By:          | Giova                          | Giovanni Esposito   | 011223  | ျပဳ                 |
| Recommended Storage:<br>Nominal Concentration (µg/mL):                | Ambient (20 °C)<br><b>1000</b> | Ċ                                     |                                |                  | (111)                       |                 | N.                      | er.                            |   |   |                     |
| NIST Test Number:   | 6UTB                           |                                       |                                | thγ              |                             | Re              | Reviewed By:            |                                | Pedro L. Rentas   | 011223  | ω                   |
| volume shown below was diluted to (mL):                               | is diluted to (mL):            | 2000.02 0.058                         | B Flask Uncertainty            |                  |                             |                 |                         |                                |   |   | L                   |
|   |                                | Dilution Initial                      | IUncertainty                   | Nominal          | Initial                     | Final u         | Expanded<br>Uncertainty | <b>SI</b><br>(Solvent Sa       | SDS Information<br>(Solvent Safety Info. On Attached pg.) | n<br>ached pg.)   | NIST                |
|   | Number Number                  | Factor Vol. (mL)                      | Pipette (mL)                   | Conc. (µg/mL) Co | Conc. (µg/mL) Conc. (µg/mL) |                 | +/- (µg/mL)             | CAS# OSHA                      | OSHA PEL (TWA)  | LD50  | SRM                 |
| 1. Nickel(II) nitrate hexahydrate (Ni)                                | 58128 033122                   | 0.1000 200.0                          | 0.084                          | 1000             | 10000.9                     | 1000.0          | 2.2 13                  | 13478-00-7 1                   | 1 mg/m3 o   | orl-rat 1620 mg/kg                                      | 3136                |
| [1] Spectrum No.1   | -                              | 9.135 sec]:56                         | sec]:58028.D# [Count] [Linear] | bunt] [Linea     | 5                           |                 |                         |                                |   |   | - 11                |
|   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| 1.0<br>ጠ  |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
|   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| 5000<br>  | NO                             | 30                                    | 40<br>0                        | 50<br>0          | 60<br>0                     | 70              | 80                      | 90                             | 100   | ŏ   |                     |
| 2500-   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
|   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| 1.067   | -<br>N<br>C                    | 130                                   | 140                            | 150              | 160                         | 170             | 180                     | 190                            | 200   | Ō   |                     |
| 51,<br>O 田 の  |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| - E - E - E   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| m/z-> 210   | N<br>N<br>O                    | 230                                   | 240                            | 250              | N<br>0                      |                 |                         |                                |   |   |                     |
|   |                                |                                       |                                |                  |                             |                 |                         |                                |   |   |                     |
| Part # 57028 Lot # 011223   |                                |                                       |                                | 1 of 2           |                             |                 |                         | Drintad: 0/15/0000 11.00.00 DM |   |   |                     |

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 Spectroscopy (ICP-MS):

|       |     |       |    |       |    |       |      | 5        | t onolu | (T) - Tarrat analyta |            |         |     |       |     |                |        |       |         |
|-------|-----|-------|----|-------|----|-------|------|----------|---------|----------------------|------------|---------|-----|-------|-----|----------------|--------|-------|---------|
| <0.02 | Zr  | <0.02 | Ŀ  | <0.02 | Ta | <0.02 | Sc   | <0.2     | ×       | <0.02                | Nd         | <0.02   | Pp  | 20.05 | Au  | <0.02          | 5      | 20.02 | Ŀ       |
| <0.02 | Z'n | <0.02 | Sn | <0.02 | s  | <0.02 | Sm   | <0.02    | Pt      | <0.02                | Mo         | <0.02   | La  | <0.02 | Ge  | <0.02          | 2 8    | <0.02 | a þ     |
| <0.02 | Y   | <0.02 | Tm | <0.02 | Sr | <0.02 | Ru   | <0.02    | P       | <0.2                 | Hg         | <0.2    | Fe  | <0.02 | Ga  | <0.02          | י כ    | <0.01 | z bi    |
| <0.02 | Υь  | <0.02 | 7  | <0.2  | Na | <0.02 | Rb   | <0.02    | Pd      | <0.02                | Mn         | <0.02   | F   | <0.02 | a G | <0.02          | ي<br>ک | <0.02 | D Da    |
| <0.02 | <   | <0.02 | T  | <0.02 | Ag | <0.02 | Rh   | <0.02    | °0      | <0.01                | Mg         | <0.02   | 5   | 20.02 | 2 8 | <0.02          | ۍ<br>۲ | 5 6   | P. AS   |
| <0.02 | Ч   | <0.02 | Te | <0.02 | Si | <0.02 | Re   | <0.02    | Nb      | <0.02                | Lu         | <0.02   | Но  | <0.02 | 1 E | -0 -2<br>-0 -2 | ς<br>β | <0.02 | 2 6     |
| <0.02 | W   | <0.02 | Ъ  | <0.2  | Se | <0.02 | Pr   | Ţ        | N       | <0.02                | ' <u>L</u> | 20.02   |     | 20.02 | ı Ç | 10.02          | 5 5    | 0.02  | <u></u> |
|       |     |       |    |       |    |       |      | 9        |         | 2000                 |            | 3       | TTF |       |     | 20.02          | CA     | <0 02 | A       |
|       |     |       |    |       |    |       | 5000 | JY ICP-M |         | Verifica             | GLAIS      |         |     |       |     |                |        |       | Ι       |
|       |     |       |    |       |    |       | 2    |          |         | くういけいう               |            | Trana M |     |       |     |                |        |       |         |
|       |     |       |    |       |    |       |      |          |         |                      |            |         |     |       |     |                |        |       |         |

(1) = 1 anglet at target

## **Physical Characterization:**

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

Certified by:

In P. S.

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

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\* 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).

| ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com | 031523   | on<br>ttached pg.) NIST<br>LD50 SRM<br>ont-rat >2000mo/kg 3109a   | Ő   | O<br>O<br>N  |
|--|--|---|---|--|
| ARA  | Ped X Gio  | SDS Information<br>(Solvent Safety Info. On Attached pg.)<br>CSHA PEL (TWA) LD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>CD5C<br>C | -0<br>0                                   | 190  |
| MUXCITI  | Formulated By:<br>Reviewed By:   | Expanded<br>Uncertainty<br>+/- (µg/mL) CAS:<br>20.0 471-34  | Q<br>R                                    | 170  |
| 170  |  | Actual Actual<br>Weight (g) Conc. (ug/mL)<br>75.2093 10001.4  | So  | 1900<br>1900<br>1900   |
| Certified Reference Material CRM   | Lot #<br>Solvent: 21110221<br>2% 60.0<br>(mL)<br>Uncertainty<br>sentainty  | Uncertainty Assay Target<br>Purity (%) (%) Weight (g)<br>0.10 38.9 75.1990  | 0.D# [Count] [Line                        | 140 150<br>240 250   |
| NV5497   | 5E-05 Balance<br>00.41 0.058 Flask Un  | Nominal Purity Uncertainty<br>Conc. ( <i>ug/m</i> L) (%) Purity (%)<br>10000 99.999 0.10  | 30<br>30                                  | - 30<br>5<br>7<br>30<br>7<br>30  |
|  | 58120<br>031523<br>031526<br>031526<br>Ambient (20<br>10000<br>6UTB<br>6UTB<br>6UTB  | Lot A<br>RM# Number Con   | 10 To 1 12                                | 220  |
| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    | CERTIFIED WEIGHT REPORT:<br>Part Number: 58120<br>Lot Number: 031523<br>Description: 031526<br>Expiration Date: 031526<br>Recommended Storage: Ambient (2<br>Nominal Concentration (µg/mL): 10000<br>NIST Test Number: 6UTB<br>Weight shown below was diluted to (mL): | Compound<br>1. Calcium carbonate (Ca)   | 2.0E4<br>1.0E4<br>3.0E4<br>5.0E4<br>2.5E4 | T.OES<br>1.0ES<br>5.0E4<br>m/2-> 2<br>m/2-> 2<br>Part # 58120 Lot # 031523 |

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Certified Reference Material CRM



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

|   | <0.02        | 3  | <0.02        | ĥ  | <0.02        | Hf | <0.02 | Ц  | <0.02        | z  | <0.02         | Ł  | <0.02 | ŝ  | <0.2  | £  | <0.02 | × | <0.02 |
|---|--------------|----|--------------|----|--------------|----|-------|----|--------------|----|---------------|----|-------|----|-------|----|-------|---|-------|
| _ | <0.02        | లి | ٣            | 固  | 40.02        | Bo | 40.02 | 3  | <u>60.05</u> | ź  | <0.02         | Se | <0.02 | ŝ  | <0.02 | Te | <0.02 | Þ | 40.02 |
|   | <b>40</b> 12 | ථ  | 40.02        | a  | <b>40.02</b> | h  | <0.02 | Mg | ±0.01        | ő  | <u>60</u> .02 | 2  | <0.02 | Ag | <0.02 | F  | <0.02 | > | <0.02 |
| _ | €0.05        | ඊ  | <0.02        | 3  | 40.02        | 놰  | <0.02 | Å  | €0.02        | æ  | <0.02         | å  | <0.02 | Na | <0.2  | Ę  | <0.02 | ያ | 40.02 |
|   | <0.01        | q  | <0.02        | g  | 40.02        | Ę  | 402   | Hg | <0.2         | ۵. | <0.02         | Ru | <0.02 | S  | €0.02 | Ę  | <0.02 | × | <0.02 |
|   | ≤0.02        | გ  | <u>60.02</u> | ප් | 40.02        | 3  | 0.02  | Mo | <0.02        | æ  | <0.02         | Sn | <0.02 | s  | <0.02 | Sn | <0.02 | Ŋ | <0.02 |
|   | ≤0.02        | ð  | <u>60.05</u> | Au | 000          | £  | <0.02 | PN | <u>40.02</u> | Å  | 40.2          | Sc | <0.02 | T. | ≤0.02 | Ę  | <0.02 | 2 | 2002  |

**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 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).

Part # 58120 Lot # 031523

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com  |  |                          |                    | Certified R  | Certified Reference Material CRM      | aterial CRI          | R 103/17                | H/2                                      |                      | AN<br>AF<br>https   | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com | Accredited<br>ate Number<br>ndards.com |
|--|--|--------------------------|--------------------|--|---------------------------------------|----------------------|-------------------------|--|----------------------|---|--|--|
| CERTIFIED WEIGHT REPORT:<br>Part Number:<br>Lot Number:<br>Description:  | r: <u>57182</u><br>rr: <u>061522</u><br>n: <u>Lead (Pb</u> )                     | -                        |                    | Solvent:   | Lot <b>#</b><br>It: 20510011          | Nitric Acid          |                         | Lievannie                                | /<br>nui E           | apertite  |  | <br>                                   |
| Expiration Date:061525Recommended Storage:Ambient (2)Nominal Concentration (ug/mL):10000NIST Test Number:6UTBWeight shown below was diluted to (mL): | e: 061525<br>e: Ambient (20 °C)<br>): 10000<br>n: 6UTB<br>rs diluted to (mL): 20 | 0 °C)<br>2000.02         | 5E-05 B<br>0.058 F | 2%<br>5E-05 Balance Uncertainty<br>0.058 Flask Uncertainty | 2% 40.0<br>mty (mL)                   | Nitric Acid          |                         | Formulated By:                           |                      | Giovanní Esposito   | 061522   | য় য                                   |
| Compound   | Lot<br>RM# : Number  | Nominal<br>Conc. (µg/mL) | Purity<br>(%)      | Uncertainty Assay<br>Purity (%) (%)                        | ay Target<br>) Weight (g)             | Actual<br>Weight (g) | Actual<br>Conc. (µg/mL) | Expanded<br>Uncertainty<br>+/- (µg/mL) C | Solvent S<br>CAS# 0S | SDS information<br>(Solvent Safety Info. On Attached pg.)<br>COHA PEL (TWA) | <b>tion</b><br>Attached pg.)<br>LD50   | NIST                                   |
| 1. Lead(II) nitrate (Pb)   | IN029 PBD122016A1  | 10000                    | 99,999             | 0.10 62.5  | 5 32.0006                             |                      | 10001.1                 |  | φ                    | 0.05 ma/m3  | introne  |  |
| [1] Speci  | [1] Spectrum No.1 [  | 17.284 s                 | 90]:58             | 85.D#  | 17.284 sec]:58182.D# [Count] [Linear] | (upe                 |                         |  |                      |   |  | 11                                     |
| ສ<br>ອ<br>ອ  |  |                          |                    |  |                                       |                      |                         |  |                      |   |  |  |
| 7.2-><br>2.0E6   | 20   | O.                       |                    | 40   | 80                                    | Co                   | 20                      | Ö<br>Ø                                   | 0                    | *   | 100  |  |
| 1.056  |  |                          |                    |  |                                       |                      |                         |  |                      |   |  |  |
| rn/z->   | 110  | 130                      |                    | 140  | 150                                   | 160                  | 170                     | 180                                      |                      | 0   | 002  |  |
| ы<br>С.<br>С.<br>Ш.<br>С.  |  |                          |                    |  |                                       |                      |                         |  |                      |   |  |  |
| R<br>A<br>E  | 210 220  | 530                      |                    | N<br>0   | 250                                   | 260                  |                         |  |                      |   |  |  |
| Part # 57182 Lot # 061522  |  |                          |                    |  | 1 of 2                                |                      |                         |  | Printed: 3           | Printed: 3/16/2023, 1:45:32 PM  | 45:32 PM   |  |

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

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

| F         |         |       |       |    |   |     |       |            |              |     |              |    |              |     |        |    |       |
|-----------|---------|-------|-------|----|---|-----|-------|------------|--------------|-----|--------------|----|--------------|-----|--------|----|-------|
|           | d <0.02 | Ŋ     | <0.02 | Hf | <0.02                                   | Li  | <0.02 | in in      | <0.02        | đ   | 4000         | 3  | C.04         | 14  | WWV    |    | 000   |
|           |         | d     | 000   | 14 | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |     |       | ;          |              | :   |              | 2  | 10           | 10  | 70.02  | *  | ZULUS |
| _         |         | đ     | 20.02 | 2  |   | 3   | <0.02 | q          | <0.02        | g   | <b>40.02</b> | ŝ  | <u>60.05</u> | Te  | \$0.02 | Ŋ  | ≤0.02 |
| 02<br>₹07 | ·       | đ     | <0.02 | 9  | 0.02                                    | Mg  | <0.01 | ő          | <0.02        | 4a  | <0.02        | Åø | 2007         | F   | 200    | 1  | Ş     |
| _         | _       | 5     | 2007  | 1  | 200                                     | 1   | 000   | i          |              |     |              | 9  |              | 17  | 70.02  | >  | 70702 |
|           |         | 3     | 70.70 | 4  |   | UIW | 20'02 | P2         | <0.02        | 2   | 40.02        | Ra | 5<br>9<br>9  | đ   | ≤0.02  | \$ | 20.02 |
|           | _       | g     | 0.02  | Ъ. | €02                                     | Нg  | <0.2  | 9          | 2002         | n d | 2007         | 2  | 000          | e   | 000    |    |       |
|           | _       | Ċ     |       | ,  |   | 0   |       | •          |              |     | 70.00        | 5  | 70.02        | 111 | 70.02  | H  | 20102 |
|           |         | 5     |       | ġ  | <0.02                                   | Wo  | <0.02 | <b>Z</b> . | <u>6</u> .62 | SB  | 40.02        | s  | <0.02        | Sn  | <000>  | Zn | 2007  |
|           |         | Au Au | <0.02 | £  | F                                       | 72  | 2007  | 2          | 500          | 0   | ~~~~~        | ŧ  |              |     |        | 1  | 10.01 |
|           |         |       |       |    |   |     | 70.00 | 4          | 10           | 20  | 20.02        | 13 |              | q   | 8.U2   | 3  | 808   |

### Physical Characterization:

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

In P M.

Certified by:

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

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

\* 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 # 57182 Lot # 061522

### CORCO CHEMICAL CORPORATION

Manufacturers of ACS Reagents and Semiconductor Grade Chemicals

### **CERTIFICATE OF ANALYSIS**

Date: 8/3/2022

M5631 M5632 M5633 M5634 Lot No 820803

Hydrogen Peroxide, ACS Reagent Grade

| TEST                       | MAXIMUM LIMITS                                       | RESULT        |
|----------------------------|--|---------------|
| Appearance                 | Colorless and free from suspended matter or sediment | Pass          |
| Assay                      | 29-32%   | 31.4%         |
| Color (APHA)               | 10   | 5             |
| Residue after Evaporation  | 0.002%   | .0001%        |
| Titratable Acid            | 0.0006 meq/g   | < .0006 meq/g |
| Chloride (Cl)              | 2 ppm  | < 1 ppm       |
| Nitrate (NO <sub>3</sub> ) | 2 ppm  | < 1 ppm       |
| Phosphate                  | 2 ppm  | < 1 ppm       |
| Sulfate (SO <sub>4</sub> ) | 5 ppm  | < .5 ppm      |
| Ammonium (NH4)             | 5 ppm  | < 1 ppm       |
| Heavy Metals (as Pb)       | 1 ppm  | < .1 ppm      |
| lron (Fe)                  | 0.5 ppm  | < .1 ppm      |
| Sodium Stannate            | 200 – 300 ppb  | Pass          |

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

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

Gína M. Rambo Office Manager

CORCO CHEMICAL CORPORATION. 299 CEDAR LANE. FAIRLESS HILLS, PA 19030. 215-295-5006. FAX 215-295-0781

| m/z->   | N.5<br>6 | m/z-≯<br>5.0E5  | ភ.<br>០<br>ពេស | m/z-><br>1.0≣6 | 5000 | 1.0트4                                 | 1. Chromium(III) nitrate nonahydrate (Cr) | Compound  | Volume sho                              | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (Jug/mL): | Par<br>De                                   | CERTIFIED WEIGHT REPORT: | www.absolutestandards.com                                   |
|---------|----------|---|----------------|----------------|------|---------------------------------------|---|---|---|---|---|--------------------------|---|
| N<br>10 |          | 110   |                | <b>1</b>       |      | [1] Spectrum No.1                     |   | Pa  | Volume shown below was diluted to (mL): | Expiration Date:<br>nended Storage:<br>ntration (µg/mL):                    | Part Number:<br>Lot Number:<br>Description: | 0                        | 3   |
| 220     |          | 120   |                | N.<br>O        |      | -                                     | 58124 071122                              | Part Lot<br>Number Number                                     | filuted to (mL):                        | 060526<br>Ambient (20 °C)<br>1000   | <u>58024</u><br>060523<br>Chromium (Cr)     |                          | A   |
| 230     |          | 130   |                | ů.<br>O        |      | 31,393 80                             | 0.1000                                    | Dilution<br>Factor  | 2000.02                                 |   | 1 (Cr)                                      |                          | MS  |
| 240     |          | 140   |                |                |      | c]:57024.                             | 200.0 0.084                               | Initial Uncertainty<br>Vol. (mL) Pipette (mL)                 | 0.058 Flask U                           |   |   |                          | MS658   |
|         |          |   |                | ð.             |      | 31,393 sec]:57024.D# [Count] [Línear] | 084 1000                                  | Uncertainty Nominal<br>Pipetta (mL) Conc. (µg/mL)             | Flask Uncertainty                       |   | 21110221<br>2.0%                            | Lot #                    | ) A   |
| N<br>50 |          | 」<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>()<br>() |                | S              |      | t] [Linear]                           | 10 10000.1                                | nał Initial<br>g/mL) Conc. (µg/mL)                            |   | (mL)  | 221 Nitric Acid<br>% 40.0                   | # Solvent:               |   |
| 200     |          | 160   |                | 0              |      | ş                                     | 0.1 <b>1000.0</b>                         | al Final<br>rg/mL) Conc. (µg/mL)                              |   | Ľ   | Acid<br>.0 Nitric Acid                      | ent:                     | 123   |
|         |          | 170   |                | 70             |      |                                       | 0.0 2.2                                   | Expanded<br>al Uncertainty<br>ig/mL) +/- (µg/mL)              | Lineviewed by.                          | X   | Acid Formulated By:                         |                          | 1   |
|         |          | 180   |                | 8-<br>0-       |      | 1                                     | 7789-02-8                                 | ) CAS   |   | a la  | Horner                                      |                          |   |
|         |          | 190   |                | Ŷ              |      |                                       |   | jolvent<br>Os   |   | ten   | Lawrence Barry                              |                          | Y   |
|         |          | 20-<br>00-  |                | 100            |      |                                       | 0.5 mg(Cr)/m3 ort-                        | SDS Information<br>nt Safety Info. On Attac<br>OSHA PEL (TWA) |   | Ø   | nce Barry                                   |                          | AH-15:<br>https://Ab  |
|         |          | 0   |                | o              |      |                                       | ort-rat 3250 mg/kg                        | ched pg.)<br>LDS0   | 00000                                   | 00050   | 060523                                      |                          | AH-1539 Certificate Number<br>https://Absolutestandards.com |
|         |          |   |                |                |      |                                       | g 3112a                                   | NIST  |   | ٥ <u> </u>  | [ω]   | 1                        | te Numbe<br>dards.com                                       |

Part # 58024 Lot # 060523

1 of 2

Printed: 8/24/2023, 4:18:27 PM

| Absolute Standards, Inc.       Certified Reference         800-368-1131       Image: Certified Reference         www.absolutestandards.com       Image: Certified Reference         Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):  | andards.cor   | s by Indu  | ictive   | y Coupled   | Plasn   | na Mass S   | Spectr C   | Certified Reference Material Ci   | ICP-M   | IS):  | ateria  | I CRM  |   |                                     |                |        | ¥          | 크             | ANAB<br>AR-11<br>ttps:/// | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com | 034 Acc<br>lificate N<br>standar | lumbe<br>ds.corr |
|--|---|--|--|---|---|---|--|---|---|---|---|--|---|-------------------------------------|----------------|--------|------------|---------------|---------------------------|--|----------------------------------|------------------|
| the stype of the style   |   |  |  |   |   | Trace N   | Metals   | s Verification  | ation   | হ   | ICP-MS  |  | /g/mL)  |                                     |                |        |            |               |                           |  |                                  |                  |
| AI <0.02   |   | 40,02  | Dv   | 40.02   | H   | <0.02   | E  | 40.02   | -<br>N  | -<br>-  | 20  |  | A) 02   | 8                                   | a)             | -      | -          |               |                           | 3  |                                  |                  |
|  |   | 40.02  | Er Dy  | <0.02   | Ho  | <0.02   | 달드   | 4)02<br>4)02  | N N   | A0.02   | 88  | <u>ም</u> ፡   | 40.02<br>0.02   | <u>8</u> %                          | 40.02<br>00.02 | ਜ ਸ    | <b>4 4</b> | c ¥           |                           | <0.02  |                                  |                  |
|  | _   | <0.02  | 말  | <0.02   | 5   | <0.02   | Mg   | <0.01   | <sup>2</sup> 0                                | <0.02   | .02   | Rh   | 40.02   | Ag                                  | <0.02          | 1      | <0.02      |               |                           | <0.02  |                                  |                  |
| Ba 40.02   | ନ<br>ଜ  | -T -T  | ନ୍ଦ୍ର ହ  | A 0.02  | ₹ <sup>1</sup> =="  | 4. 6. B   | H. Ma  | A. A.   | P P   | A A 3 3   | 38  | 장  | A A<br>3<br>3   | ç N                                 | A A 1          | 13     | A.2        | 4 15          |                           | 0.02<br>0  |                                  |                  |
|  |   | 40.02  | 2 ଜ ା  | 40.02   | 323   | 4 4 A   | N M ;  | 8 8 8   | × 77 ·  | A 40 12   | រ ន រ   | Sc Sm  | 40.02<br>2002   | Ta s                                | 4 4 A 4        | 11 S 🔒 |            |               |                           |  |                                  |                  |
|  |   |  |  |   |   |   |  | (T)=  | (T)= Target analyte                           | anatyte   |   |  |   |                                     |                |        |            |               |                           |  |                                  |                  |
| Physical Characterization:   | aracteriz   | ation:   |  |   |   |   |  |   |   |   |   |  |   |                                     |                |        | C          | Certified by: | by:                       |  | a                                |                  |
| Homogeneity: No heterogeneity was observed in the preparation of this standard.  | No heteroge   | meity was o  | observe  | d in the preps  | aration (   | of this stand   | lard.  |   |   |   |   |  |   |                                     |                |        | 1          | 14            | 1                         |  | ľ                                |                  |
| <ul> <li>* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.</li> <li>* 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.</li> <li>* All standard containers are meticulously cleaned prior to use.</li> <li>* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).</li> <li>* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.</li> <li>* All standards should be stored with caps tight and under appropriate laboratory conditions.</li> <li>* 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).</li> </ul> | ad value is<br>ds, 18.2 n<br>ation of all<br>are prepar<br>are prepar<br>are certife<br>ds should<br>ds should<br>ent Result. | he conc<br>megohm d<br>Ill standarc<br>are me<br>ars are me<br>are are are me<br>ars are me<br>ars are me<br>ars are me<br>ars are me<br>ars are me<br>are are are me<br>are are are me<br>are are are are are<br>are are are are are<br>are are are are are are<br>are are are are are are are are are<br>are are are are are are are are are are | entrat<br>leioniz<br>ls.<br>sticulou<br>etrica<br>.5% of<br>.5% of<br>.5 | ed water, c<br>ed water, c<br>usly cleane<br>ully using ba<br>f the state<br>f the state<br>f the state<br>and Kuyat,<br>a Note 122 | ted fro<br>calibrat<br>d prior<br>alanced<br>d value<br>and un<br>and un<br>97, U.S | red Class,<br>ted Class,<br>that are<br>that are<br>that are<br>der appro<br>Guideline<br>Guideline | A glass<br>A glass<br>calibra<br>priate<br>s for E<br>nent P | nd volume<br>sware and<br>ited with<br>ites stated<br>laborator,<br>ivaluating<br>vinting Off | the hi<br>weight<br>cond<br>y cond<br>fice, W | ighest p<br>ighest p<br>is trace<br>itions.<br>xpressir<br>/ashingt | ments<br>ourity<br>able tr<br>able the<br>ton, D. | unless<br>raw m<br>raw m<br>NIST<br>0 NIST<br>0.<br>C. (19 | materials are used in<br>Materials are used in<br>ST (see above).<br>ertainty of NIST<br>1994). | se stat<br>re usec<br>vve).<br>NIST | n .            |        |            |               |                           |  |                                  |                  |
|  |   |  |  |   |   |   |  |   |   |   |   |  |   |                                     |                |        |            |               |                           |  |                                  |                  |
|  |   |  |  |   |   |   |  |   |   |   |   |  |   |                                     |                |        |            |               |                           |  |                                  |                  |

Part # 58024 Lot # 060523

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    | CERTIFIED WEIGHT REPORT: |   | Ex               | Recommended Storage:<br>Nominal Concentration (µg/mL): | NIST                     | Volume s                                | Compound  | 1. Copper(II) nitrate trihydrate (Cu) | 1.0E8 | 5.0E5                                     | m/z->                          | 2.5E7 | m/z-≻<br>2.0€7 | 1.0€7 | m/z-> |
|--|--------------------------|---|------------------|--|--------------------------|---|---|---------------------------------------|-------|---|--------------------------------|-------|----------------|-------|-------|
| om as, Inc.  |                          | Part Number:<br>Lot Number:<br>Description: | Expiration Date: | Recommended Storage:<br>Concentration (µg/mL):         | <b>NIST Test Number:</b> | Volume shown below was diluted to (mL): | z   |                                       |       |   | 10                             |       | 110            |       | 2     |
| -  |                          | 58029<br>102523<br>Copper (Cu)              | 102526           | Ambient (20 °C)<br>1000                                | 6UTB                     | t diluted to (mL)                       | Part Lot<br>Number Number   | 58129 100223                          |       |   | N                              |       | 120            |       |       |
|  |                          | (Cu)  |                  | 20 °C)   |                          | 2000.02                                 | Dilution<br>Factor  | 0.1000                                |       |   | 30                             |       | 130            |       |       |
| Certif   |                          |   |                  |  | 5E-05 Balance            | 0.058 Flask U                           | Initial Uncertainty<br>Vol. (mL) Pipette (mL)                       | 200.0 0.084                           |       |   | 4°                             |       | 140            |       |       |
| ified Referen<br>M569子   | Lot #                    | 24002546                                    | 2.0%             |  | Balance Uncertainty      | Flask Uncertainty                       | Initial Uncertainty Nominal<br>Vol. (mL) Pipette (mL) Conc. (µg/mL) | 84 1000                               |       |   | 50                             |       | 150            |       |       |
| Certified Reference Material CRM<br>M 56 G子 R いり0/2                                      | Solve                    | 46 Nitric Acid                              | 40.0<br>(mL)     |  |                          |   | Initial<br>nL) Conc. (µg/mL)  | 10000.1                               |       |   | 80                             |       | 0 160          |       |       |
| 1 CRM<br>10   27   23  |                          | L   | Nitric Acid      |  |                          |   | Final<br>L) Conc. (µg/mL)   | 1000.0                                | 894   | tinna an | paine dissipsion of the design |       | 0 170          |       |       |
|  |                          |   | Formulated By:   | Mg .   | Reviewed By:             |   | cxpanoed<br>Uncertainty<br>+/- (µg/mL)                              | 2.2                                   |       |   | 70                             |       |                |       |       |
| -  |                          | and and                                     |                  | to the   | -70                      |   | (Solven<br>CAS# C   | 10031-43-3                            |       |   | 8<br>0                         |       | 180            |       |       |
| http:  |                          |   | Benson Chan      | and a  | Pedro L. Rentas          |   | (Solvent Safety Info. On Attached pg.)<br># OSHA PEL (TWA) LD50     | 1 mg/m3                               |       |   | 90                             |       | 190            |       |       |
| ANAB ISO 17034 Accreditec<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |                          |   | 102523           | ,  | 102523                   |   | Attached pg.)   | ori-rat 794 mg/kg                     |       |   | 100                            |       | N<br>0         |       |       |
| Accredite<br>ate Numbe<br>Idards.com   | 4                        |   | 23               |  | ដ្រ                      |   | NIST  | 3114                                  |       |   |                                |       |                |       |       |

www.absolutestandards.com 300-368-1131 Absolute Standards, Inc.



**Certified Reference Material CRM** 



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

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

| Γ  |       |   |       |     |       |    | Trace M | etals          | ; Verifica | ition    | by ICP-N           | r) SI | g/mL)                |       |                          |    |       |    |                   |
|----|-------|---|-------|-----|-------|----|---------|----------------|------------|----------|--------------------|-------|----------------------|-------|--------------------------|----|-------|----|-------------------|
|    | 3     | 2 | 22    | 7   |       |    | 2       | and the second |            | Sale Con | Constraint for the |       | Sector Sector Sector | March | Contraction of the other |    |       |    | The second second |
| A  | 40.02 | 8 | 20,02 | Dy  | <0.02 | Hf | <0.02   | 5              | <0.02      | N        | <0.02              | Pr    | <0.02                | Se.   | <0.2                     | 5  | <0.02 | W  | <0.02             |
| SB | 40.02 | ß | <0.2  | Ę   | <0.02 | Ho | <0.02   | Ŀ              | <0.02      | Ŗ        | <0.02              | Re    | <0.02                | 2     | <0.02                    | ī  | <0.02 | c  | <0.02             |
| As | 40.2  | ů | <0.02 | F   | <0.02 | F  | <0.02   | Mg             | <0.01      | õ        | A0.02              | Rb    | A0.02                | Ag    | 40.02                    | 3  | 40.02 | <  | 4002              |
| Ba | <0.02 | S | <0.02 | ନ୍ଥ | <0.02 | 5  | 40.02   | Mb             | <0.02      | Pd       | <0.02              | Rb    | A).02                | Na    | 40 i2                    | đ  | 40.02 | \$ | 40.02             |
| Be | <0.01 | ዮ | <0.02 | Ga  | <0.02 | Fe | <0.2    | Hg             | <0.2       | 'n       | <0.02              | Ru    | <0.02                | Sr    | 40.02                    | j  | <0.02 | ĸ  | 40.02             |
| Bi | <0.02 | S | <0.02 | ĉ   | <0.02 | La | 40.02   | Mo             | <0.02      | ¥        | <0.02              | Sm    | <0.02                | s     | <0.02                    | Sn | <0.02 | 2  | 40.02             |
| œ  | <0,02 | ß | -1    | Au  | <0.02 | 3  | <0.02   | Nd             | <0.02      | ĸ        | <0.2               | 8     | <0.02                | Ta    | <0.02                    | H  | <0.02 | 2  | 40.02             |

(T) = Target analyte

Physical Characterization:

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

in politic

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).

urt # 58029 Lot # 102523

| 800-368-1131<br>www.absolutestandards.com                   | CERTIFIED WEIGHT REPORT: |  | ņ                          |                  | Recommended Storage:<br>Nominal Concentration (µg/mL):     | NIST                   | Volume                                  |  | Compound       | 1. Manganese(II) nitrate tetrahydrate (Mn) | Сл.<br>О ПП<br>Ф                      | 2.5E8 | <b>M</b> /2-2 | 1.008 | 5.OM7 | ™/z-><br>1.0E8 | 5.067 | m/z-> |
|---|--------------------------|--|----------------------------|------------------|--|------------------------|---|--|----------------|--|---------------------------------------|-------|---------------|-------|-------|----------------|-------|-------|
| om  | Ð                        | Part Number:<br>Lot Number:<br>Description:  | niration Data.             | Expiration Date. | <pre>Hecommended Storage:<br/>Concentration (µg/mL):</pre> | NIST Test Number:      | Volume shown below was diluted to (mL): |  | Nu             |  | [1] Speatrum No.1                     |       | 10            |       |       | -1<br>-1-0     |       |       |
|   |                          | <u>58025</u><br>102623<br>Manganese (Mn)   | 100606                     | Ambiant (on t    | Ampient (20 °C)<br>1000                                    | 6UTB                   | diluted to (mL):                        | Part Lot                               | r<br>z         | 58125 071123                               | -                                     |       | 20            |       |       | ן<br>מ<br>ס    |       |       |
|   |                          | (Mn)   |                            | 2                | C)   | 5E-05                  | 3000.41 0.058                           | Dilution                               |                | 0.1000 300.0                               | 34.243 sec]:57025.D# [Count] [Linear] |       | 30            |       |       | 130            |       |       |
| Certified Re<br>M5648                                       |                          |  |                            |                  |  | 05 Balance Uncertainty | 58 Flask Uncertainty                    | lal Uncertainty                        | Pipette (mL)   | 0.084                                      | 7025,D# [C                            |       | 40            |       |       | 140            |       |       |
| ference<br>A  | Lot #                    | 24002546   | 2.0%                       |                  |  | ainty                  | ł                                       | Nominal                                | Ē              | 1000                                       | ount] [Lines                          |       | 0             |       |       | 150            |       |       |
| Material CRM  | Solvent:                 | Nitric Acid  |                            | (1112)           |  |                        |   | Initial                                | m              | 10000.1 10                                 | ŗ                                     |       | 0             |       |       | 1e0            |       |       |
|   |                          |  | Nitric Acid Formulated By: |                  | X  | Reviewed By:           |   | Expanded<br>Final Lincertainty         | (mL)           | 1000.0 2.1                                 |                                       |       | 8             |       |       | 170            |       |       |
|   |                          |  | ted By:                    | 0                | ed to  | ed By:                 |   |  | ) CAS          | 20694-39-7                                 |                                       |       | 9<br>0        |       |       | 180            |       |       |
| http  |                          | Contraction of the second seco | Benson Chan                | Y                | tento  | Pedro L. Rentas        |   | (Solvent Safety Info. On Attached no.) | OSHA PEL (TWA) | 7 5 mg/m3                                  |                                       |       | 80            |       |       | 190            |       |       |
| AR-1539 Certificate Number<br>https://Absolutestandards.com |                          | ,  | 102623                     |                  | /  | 102623                 |   | nation<br>On Attached no.)             | A) LD50        | ort-rat >300mg/kg                          |                                       |       | 100           |       |       | 200            |       |       |
| e Numbe   |                          |  |                            |                  |  | لت                     | .,                                      | NIST                                   | SRM            | 3132                                       |                                       |       |               |       |       |                |       |       |

Part # 58025 Lot # 102623

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):

| 202   | r, | 40.02 | 3  | 40.02 | Ta          | <0.02             | s        | <0.2                | ĸ  | <0.02         | Nd          | 40.02       | РЪ         | 40.02 | Au  | <0.02 | ß | 40.02        | ₿   |
|-------|----|-------|----|-------|-------------|-------------------|----------|---------------------|----|---------------|-------------|-------------|------------|-------|-----|-------|---|--------------|-----|
| 20.02 | Zn | <0.02 | S  | 40.02 | s           | <0.02             | Sm       | <b>40.02</b>        | ¥  | <0.02         | Mo          | <0.02       | La         | <0.02 | ĉ   | <0.02 | S | 40.02        | Bi  |
| <0.02 | Y  | <0.02 | Tæ | <0.02 | ş           | <0.02             | Ru       | <0.02               | q  | <0.2          | Нg          | <b>40.2</b> | Fe         | <0.02 | G   | <0.02 | Ω | <0.01        | Be  |
| 40,02 | 41 | <0.02 | Th | 40.2  | Na          | <0.02             | Rb       | <0.02               | Pd | Ч             | Mn          | <0.02       | . <b>F</b> | <0.02 | ନ୍ଥ | <0.02 | S | <0.02        | Ba  |
| 40.02 | <  | <0.02 | H  | <0.02 | Ag          | <0.02             | 8        | <0.02               | 8  | 40.01         | Mg          | <0.02       | In         | <0.02 | 臣   | <0.02 | ĉ | A0.2         | As  |
| 40.02 | ٩  | <0.02 | Te | A0.02 | S           | <0.02             | Re       | <0.02               | Ŋ  | 40.02         | Ŀ           | <0.02       | Ho         | <0.02 | Ę   | <0.2  | ß | <b>40.02</b> | SP  |
| 40.02 | W  | <0.02 | 1  | <0.2  | 8           | <0.02             | P        | <0.02               | N  | <0.02         | Ľ           | <0.02       | Hŕ         | <0.02 | Dy  | <0.02 | ß | A0.02        | A   |
|       |    |       |    |       | Section 200 | A CONTRACTOR OF A | ALC: NO. | A PARTY AND AND AND |    | Store Manager | State State |             |            |       |     |       |   |              | 100 |
|       |    |       |    |       |             |                   | ST CI    | DY ICP-N            |    | verifica      | etais       | I race M    |            |       |     |       |   |              |     |

(T) = Target analyte

Physical Characterization:

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

In 1. Sli

Certified by:

\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the balances that are calibrated with weights traceable to NIST (see above). \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

\* 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).

art # 58025 Lot # 102623

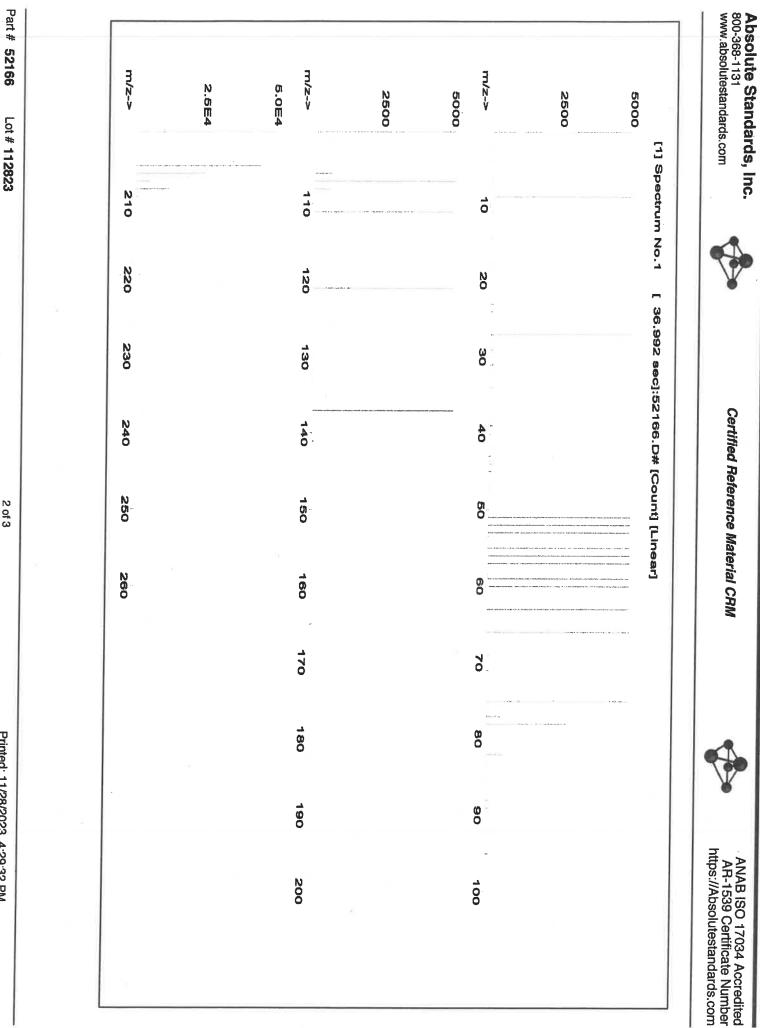
2 of 2

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Part # 52166 Lot # 112823

1 of 3

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| * * * * * * *  |       | Papel   | Hard .                     |  |  | WWW  |   |
|--|-------|---|----------------------------|--|--|--|---|
| The c<br>Purifie<br>the purifie<br>All stand<br>All stand<br>Uncer<br>Measu  |       | lomoge  | Physical Characterization: | <u>888888888888888888888888888888888888</u>  |  | ADSOLUTE Standards,<br>800-366-1131<br>www.absolutestandards.com                         |   |
| ertified<br>acids<br>reparat<br>indard ar<br>ards ar<br>ards ar<br>indards ar<br>tainty f  |       | neity: N  | al Cha                     | 40.02<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10<br>10  |  | nental   | ? |
| value i<br>ion of a<br>contain<br>e prepa<br>e certif<br>shoulc<br>t Resul   |       | o heteroj   | racteri                    | 58558<br>58558   |  | Analy  |   |
| The certified value is the concen<br>Purified acids, 18.2 megohm dei<br>the preparation of all standards.<br>All standard containers are meti<br>Standards are prepared gravime<br>Standards are certifed (+/-) 0.5<br>All standards should be stored w<br>Uncertainty Reference: Taylor, E<br>Measurement Result," NIST Tech  |       | geneity v   | zation                     |  |  | Standards, Inc.<br>astandards.com  |   |
| oncent<br>m deio<br>dards.<br>metic:<br>avimetr<br>-) 0.5%<br>-) 0.5%<br>-) 7 Fechr  | 8     | vas obse  |                            | A Ch Ch E E E DA   |  | nducti   |   |
| nized v<br>nized v<br>lously u<br>ically u<br>th caps<br>th caps<br>N. and<br>N. and   |       | rved in 1   |                            |  |  |  |   |
| vater, c<br>vater, c<br>cleane<br>sing ba<br>state<br>state<br>tight a<br>kuyat,<br>Kuyat,   |       | he preps  |                            | 4 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  | and and a second                         |  |   |
| red fror<br>alibrate<br>alibrate<br>d prior<br>lances<br>d value,<br>d value,<br>C.E., "<br>7, U.S.  |       | uration o   |                            | 323443343  |  |  |   |
| The certified value is the concentration calculated from gravi<br>Purified acids, 18.2 megohm deionized water, calibrated Class<br>the preparation of all standards.<br>All standard containers are meticulously cleaned prior to use.<br>Standards are prepared gravimetrically using balances that ar<br>Standards are certifed (+/-) 0.5% of the stated value, unless<br>All standards should be stored with caps tight and under app<br>Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelir<br>Measurement Result," NIST Technical Note 1297, U.S. Govern   |       | Homogeneity: No heterogeneity was observed in the preparation of this standard. |                            |  | race I                                   |  |   |
| <ul> <li>* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.</li> <li>* 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.</li> <li>* All standard containers are meticulously cleaned prior to use.</li> <li>* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).</li> <li>* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.</li> <li>* All standards should be stored with caps tight and under appropriate laboratory conditions.</li> <li>* 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).</li> </ul> |       | ndard.  |                            | Mo Hg Mg L L   | Trace Metals Verification by ICP-MS (µg) | Solute Standards, Inc.<br>368-1131<br>v.absolutestandards.com                            |   |
| and voi<br>ssware<br>ssware<br>wise sta<br>e labora<br>Evaluat<br>Evaluat  |       |   |                            |  | Verif                                    | Certified Reference Material CRM   |   |
| and th<br>and th<br>ith wei<br>ith wei<br>ing and<br>ing and   |       |   | (T) = Ti                   |  | ication                                  | 1 Refe   |   |
| c meas<br>e highe<br>ghts tr<br>ghts tr<br>d Expre<br>d Expre  |       |   | (T) = Target analyte       | K P P Z OS NN  | h by I                                   | rence  |   |
| uremer<br>st purit<br>aceable<br>ns.<br>ns.<br>rssing t  |       |   | alyte                      | - A 0,02<br>A 0,02 | P-MS                                     | Materi   |   |
| nts unk<br>ty raw<br>ty raw<br>be to Nis   |       |   |                            | Sc S   | (µg/                                     | al CRI   |   |
| iless oth<br>v materia<br>IIST (see<br>lIST (see<br>(1994).  |       |   |                            | 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8  | /mL)                                     | A A  |   |
| als are<br>als are<br>above<br>of NI   |       |   |                            | Sr.  |  |  |   |
| stated in<br>used in<br>).   |       |   |                            | 40.2 T 20 T  |  |  |   |
|  |       |   |                            |  |  |  |   |
|  |       |   |                            | 38233333   |  |  |   |
|  | 1     |   |                            | 40.02<br>40.02<br>40.02<br>40.02   |  |  |   |
|  | M. L. |   |                            | おびょびょりゃ  |  |  |   |
|  | the   |   |                            | 40.02<br>40.02<br>40.02<br>7<br>40.02<br>7<br>7  |  | IAB IS<br>3-1539<br>s://Abs  |   |
|  |       | 2   |                            | 2 2 2 2 2  |  | 0 170<br>olutes  |   |
|  |       | 1   |                            |  |  | 34 Acc<br>licate N<br>tandar   |   |
|  |       |   |                            |  |  | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com |   |

Part # 52166 Lot # 112823

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| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com  | M   | M5768 [M5769 (64)<br>Certified Reference Material   | ce Material CRM   | 42/s                                       | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com    |
|--|---|---|---|--|---|
| CERTIFIED WEIGHT REPORT:<br>Part Number:<br>Lot Number:<br>Description:  | <u>58112</u><br>091823<br>Magneslum (Mg)  | Solvent: 24   | Lot #<br>24002546 Nitric Acid                               | Advenue                                    | Or -  |
| Expiration Date:       091826         Recommended Storage:       Ambient (         Nominal Concentration (µg/mL):       10000         NIST Test Number:       6UTB         Weight shown below was diluted to (mL): | 20 °C)                                    |   | (mL)<br>(mL)<br>$(BF)$ $R - \frac{1}{3}/2\phi$              | Formulated By:<br>Heviewed By:             | Lawrence Barry 091823<br>Pedro L. Rentas 091823   |
| Compound   | Lot Nominal I<br>RM# Number Conc. (µg/mL) | Purity Uncertainty Assay T<br>(%) Purity (%) (%) We | Target Actual Actual<br>Weight (g) Weight (g) Conc. (vg/mL) | Expanded<br>Uncertainty<br>+/- (µg/mL) CAS | SDS Information<br>(Solvent Safety Info. On Attached pg.) NIST<br># OSHA PEL (TWA) LDSO SRM |
| 1. Magnesium nitrate hexahydrate (Mg) IN030 маюзаал  | 10000                                     | 99.999 0.10 8.51 23                                 |   | 20.0 13446-1                               | ng/kg 3   |
| [1] Spectrum No.1<br>1.0E6   |   | [ 19.923 sec]:58112.D# [Count] [Linear]             | [Linear]  |  |   |
| 5.<br>O M<br>B<br>R  |   |   |   |  |   |
| m/z-> 10   | 20  | 8   | ø   | 70 80                                      | 90 100  |
| 1000 -   |   | ·   |   | 4  |   |
| ₩/z->  | 120 130                                   | 140   | 150 160   | 170 180 1                                  | 190   |
| 1.0<br>1.0<br>1.0<br>1.0<br>1.0<br>1.0<br>1.0<br>1.0   |   |   |   |  |   |
| Part # 58112 Lot # 091823  |   | -   | 1 of 2  | Drintod                                    | Drintod- 10/00/0000 0.56-15 DM  |

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|---------------------------|-------------|-----------------------|
|                           |             | Inc                   |



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

| Γ        |       |   |              |    |       |    | Trace Mo | etals | Verifica         | tion | by ICP-N | IS (µ | g/mL) |     |                   |     |       |    |       |
|----------|-------|---|--------------|----|-------|----|----------|-------|------------------|------|----------|-------|-------|-----|-------------------|-----|-------|----|-------|
|          |       |   |              |    |       |    |          |       | 1100 100 100 100 |      |          |       |       | 100 | The second second |     |       |    |       |
| A        | <0.02 | 8 | <0.02        | Dy | <0.02 | Hf | <0.02    | 5     | <0.02            | Ni   | <0.02    | Ŗ     | <0.02 | Se  | 40.2              | qI. | <0.02 | W  | <0.02 |
| SP       | <0.02 | G | <0.2         | E. | <0.02 | Но | <0.02    | Lu    | <0.02            | Nb   | <0.02    | Re    | <0.02 | ŝ   | <0.02             | Te  | <0.02 | d  | <0.02 |
| As       | <0.2  | ĉ | <0.02        | E  | <0.02 | In | <0.02    | Mg    | ]                | SO   | <0.02    | Rh    | <0.02 | Ag  | <0.02             | H   | <0.02 | V  | 40.02 |
| Ba       | <0.02 | S | <0.02        | ନୁ | <0.02 | F  | <0.02    | Mn    | <0.02            | Pd   | <0.02    | Rb    | <0.02 | Na  | <0.2              | Ъ   | <0.02 | Υb | <0.02 |
| Ве       | <0.01 | Ŷ | <0.02        | Ga | <0.02 | Fe | 40.2     | Hg    | <0.2             | ٩    | <0.02    | Ru    | <0.02 | Sr  | <0.02             | Tm  | <0.02 | ĸ  | <0.02 |
| B        | <0.02 | S | <0.02        | Ģ  | <0.02 | La | <0.02    | Mo    | <0.02            | Ŗ    | <0.02    | Sm    | <0.02 | ŝ   | <0.02             | Sn  | <0.02 | 6  | <0.02 |
| <b>5</b> | 40.02 | ç | <b>40.02</b> | Au | <0.02 | P  | <0.02    | Nd    | <0.02            | ĸ    | <0.2     | S.    | <0.02 | Ta  | <0.02             | Ti  | <0.02 | Zr | <0.02 |

(T) = Target analyte

**Physical Characterization:** 

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

Certified by:

\* 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 # 58112 Lot # 091823



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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 the second se | A CONTRACTOR OF A CONTRACTOR |    |       |    |         | All and the | TANK ALL STATE | The second s | ALL DESCRIPTION OF THE OWNER OF T | Nonese and |         |    | and the second second second |         |              |    | A COLUMN TO A C | 10 |
| A  | <0.02 | 3   | <0.02   | à  | <0.02 | Hf | <0.02   | ГI          | <0.02          | N  | <0.02   | Ł          | <0.02   | Se | <0.2                         | Trb     | <0.02        | M  | <0.02   | -  |
| Sb | <0.02 | J   | 40.2  | 固  | <0.02 | Ho | ≤0.02   | 2           | <0.02          | £  | <0.02   | Re         | <0.02   | S  | <0.02                        | Pe<br>L | <b>40.02</b> | D  | <0.02   | _  |
| As | <02   | ඊ   | <0.02   | Eu | 40.02 | ч  | 40.02   | Mg          | 10.0>          | ő  | <0.02   | Rh         | <0.02   | Ag | <0.02                        | F       | ≤0.02        | >  | <0.02   | -  |
| Ba | <0.02 | ű   | <0.02   | 3  | 40.02 | Ц  | 40.02   | Mn          | <0.02          | P  | ≤0.02   | £          | <0.02   | Ra | <b>40</b> 12                 | đ       | <0.02        | \$ | <0.02   | -  |
| Be | T     | Ċ   | 0.02  | G  | <0.02 | e. | <02     | Hg          | <02            | ۵.   | <0.02   | Ru         | ≤0.02   | 2  | <0.02                        | μ       | <0.02        | 7  | <0.02   | -  |
| Ä  | <0.02 | රී  | <0.0≥   | පී | <0.02 | r. | <0.02   | Mo          | <0.02          | đ,   | <b>40.02</b>  | Sm         | ≤0.02   | s  | <0.02                        | Sn      | <0.02        | Za | <0.02   | -  |
| æ  | <0.02 | ð   | <0.02   | Au | <0.02 | £  | 40.02   | PN          | <0.02          | М  | <0.2  | ŝ          | <0.02   | Ta | <0.02                        | F       | <0.02        | 2  | 40.02   | _  |
|    |       |   |   |    |       |    |         |             | (T) = Tarr     | get analy  | yte   |            |         |    |                              |         |              |    |   | 1  |
|    |       |   |   |    |       |    |         |             |                |  |   |            |         |    |                              |         |              |    |   |    |

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

| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com   | •  | Cei   | Certified Reference Material CRM                    | ial CRM   |                           | ANAB ISO 17034 Accredited                                   |
|---|--|---|---|---|---------------------------|---|
| www.absolutestandards.com   | 5  |   |   |   | <b>V</b>                  | AR-1539 Certificate Number<br>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  |   |   |                           |   |
| A)2<br>C<br>C   |  | 2 2 2<br>2 2 2 2  | 40.02 Ni  |   | Se <0.2 Tb<br>Si <0.02 Te | 40.02 W 40.02   |
| 2 2 2 2<br>2 2 2 2  |  |   | <0.01 Os<br><0.02 Pd                                | Rb<br>Rb  |                           | \$ < c  |
|   | Ge 40.02   | Fe 40.2 Hg  | 40.2 P<br>40.02 Pt                                  | Ru<br>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<br>4  |   |   | 20                        |   |
|   |  |   |   |   | ÷                         |   |
| <ul> <li>* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.</li> <li>* 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.</li> <li>* All standard containers are meticulously cleaned prior to use.</li> <li>* Standards are prepared gravimetrically using balances that are politoriated with using balances.</li> </ul> | centration calculat<br>deionized water, ca<br>ds.<br>eticulously cleaned | d from gravimetric<br>librated Class A gla<br>prior to use. | and volumetric measurer<br>ssware and the highest p | nents unless otherwise stated.<br>writy raw materials are used in | ie stated.<br>'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

Printed: 2/8/2024, 5:01:38 PM

| redited<br>Jumber<br>ds.com  | NIST<br>SRM  | 3113                                      |   |                                      |
|--|--|---|---|--------------------------------------|
| ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com | Formulated By: Lawrence Barry 091923<br>Formulated By: Lawrence Barry 091923<br>Reviewed By: Pedro L. Rentas 091923<br>Expanded SDS Information<br>Uncertainty (Solvent Safety Info. On Attached pg.) N<br>+/- (ug/mL) CAS# 0SHA PEL (TWA) LD50 S  | ng/kg                                     | 180 B0<br>190 200<br>200 200  | Printed: 2/8/2024, 5:01:14 PM        |
| AM<br>I'U ( fru (  | Nitric Acid  | 1000.0                                    |   |                                      |
| Certified Reference Material CRM $02109124$  | Solvent:<br>Nttric Acid<br>40.0<br>(mL)<br>httal<br>bittal<br>Conc. (ug/mL)  | 10000.0                                   |   |                                      |
| artified Réference l<br>0 2   0 9 1 2 4  | Lot # 24002546<br>24002546<br>2.0%<br>2.0%<br>Nominat<br>Nominat<br>Conc. (rg/mL)  | 1000                                      | 34.243 eec]:58027.D# [Count] [Linear]<br>30 40 50<br>130 140 150<br>230 240 250 | 1 of 2                               |
| Certified F  |  | 0.084                                     | 240<br>240<br>240   |                                      |
| Å  | 5E-05<br>0.058<br>on Initial<br>or Vol. (mL)   | 00 200.0                                  | 3 eec]:55<br>230 30<br>23 130   |                                      |
|  | 57027<br>091923<br>Cobait (Co)<br>091926<br>Ambient (20 °C)<br>1000<br>6UTB<br>6UTB<br>6UTB<br>d to (mL): 2000.02<br>Lot Dilution<br>Lot Dilution  | 23 0.1000                                 |   |                                      |
|  | 57027<br>091923<br>Cobalt (<br>Cobalt (<br>Ambient<br>Ambient<br>1000<br>6UTB<br>ss diluted to (mL<br>Part Lot   | 58127 050923                              |   |                                      |
| Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    | CERTIFIED WEIGHT REPORT:<br>Part Number:<br>Lot Number:<br>Description:<br>Cobait (C<br>Cobait (C<br>Cobait (C<br>091926<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>Nominal Concentration (µg/mL):<br>Nominal Concentration (µg/mL):<br>NIST Test Number:<br>COTB<br>NIST Test Number:<br>COTB<br>CODAIT (C)<br>CODAIT (C)<br>C)<br>CODAIT (C)<br>C)<br>C)<br>C)<br>C)<br>C)<br>C)<br>C)<br>C)<br>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  | ₫.02  | M  | <b>40.02</b> |
| _ | 40.02 | లి | <b>4</b> 02   | 山  | €0.02         | Ho | 40.02       | 5  | <0.02             | Ż  | <u>40.02</u> | Re | <0.02        | 3        | ≤0.02        | Te | €0.02 | D  | <0.02        |
| _ | 402   | ථ  | €0.05         | 圕  | 40.02         | Ч  | 40'02       | Mg | 10 <sup>0</sup> ⊳ | ő  | ≤0.02        | 붭  | <0.02        | Ag       | <b>40.02</b> | F  | <0.02 | Ż  | <0.02        |
| _ | 40.02 | చి | ≤0.02         | ઝ  | <b>600</b>    | 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  | <b>20.0</b> 2 | ङ  | 402         | Hg | 40.2              | ۵. | €0.02        | Ru | <0.02        | <u>ې</u> | ≪0.02        | Ta | ≤0.02 | Y  | €0.02        |
| _ | <0.02 | ථ  | £-            | ö  | 40.02         | Ľ  | <b>0</b> 02 | Mo | <u>60.02</u>      | æ, | <0.02        | Sm | <0.02        | S        | <0.02        | Sn | <0.02 | 2  | <b>6</b> .02 |
| _ | 40.02 | ට් | <0.02         | Au | <b>40.02</b>  | £  | 40.02       | PN | 40.02             | м  | <b>4</b> 02  | 8  | <b>40.02</b> | £        | 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   |
|   |                                       | G<br>O<br>O   |
| 160 170 180 190 200   | 130 140 150 1                         | m/≥-> 110 120 1   |
|   |                                       | N<br>m<br>4   |
| 80 70 80 100  | 90<br>40<br>50                        | 5.0E4   |
|   |                                       | - 1<br>0<br>0<br>0<br>0   |
|   | 34.433 sec]:57033.D# [Count] [Linear] | [1] Spectrum No.1 [ 34.433<br>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 <b>SDS Information</b><br>Final Uncertainty (Solvent Safety Info. On Attached pg.)<br><u>nL) Conc. (ug/mL) +/- (ug/mL) CAS</u> # OSHA PEL (TWA) LD50 | 11                                    | Part Lot Dilution<br>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<br>2.0% 80.0     | Description: <u>Arsenic (As)</u>                                      |
| п<br>(  | Lot <b>#</b> Solvent:                 |   |
| ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com  | Certified Reference Material CRM      | Absolute Standards, Inc.<br>800-368-1131<br>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

| $\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<br>114 | 5.OE4         | 1. Ammonium dihydrogen phosphate (P) | Compound  | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Test Number:<br>Weight shown below wa | CERTIFIED WEIGHT REPORT:<br>Par<br>Lo<br>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         772.751         5mg/r           12.074         aeoc)15891 16. D/r         Country [Linear)         Statum         Stat   | N<br>O |      | 110   |     | 10       |            | [1] Spectrum  |                                      | -   | Expiration Date:<br>Recommended Storage:<br>I Concentration (µg/mL):<br>NIST Test Number:<br>Weight shown below was d    | DRT:<br>Part Number:<br>Lot Number:<br>Description: | om                          |
| RICZINGLA         MITELS           Bolvent:         21110221         Nitric Acid           IDP         2%         40.0         Nitric Acid           SEC5         Balance locentary<br>(mL)         Nitric Acid         Formulated Br.         Formulated Br.           SEC5         Balance locentary<br>(mL)         Nitric Acid         Formulated Br.         Lawrence Balance<br>(mL)         Formulated Br.         Lawrence Balance<br>(mL)         Formulated Br.         Lawrence Balance<br>(mL)         Source It<br>Mitels Acid         Formulated Br.         Lawrence Balance<br>(ML)         Source It<br>Mitels Acid         Formulated Br.         Lawrence Balance<br>(ML)         Source It<br>Mitels Acid         Formulated Br.         Formulated Br | 2220   |      | 120   |     | N.<br>O  |            |               |                                      | Lot<br>Number   | 041726<br>Ambient (20<br><b>10000</b><br>6UTB<br>6UTB  | 57115<br>041723<br>Phosphore                        | 5                           |
| Hric Acid<br>Iric Acid<br>Iric Acid<br>Iric Acid<br>Iric Acid<br>Actual<br>Actual<br>Actual<br>Expanded<br>Expanded<br>Expanded<br>SDS Inf<br>Expanded<br>SDS Inf<br>Solvent Safety Inf<br>eight (g) Conc. (ug/mL) · (AS# OSHA PEL)<br>2.7289 10000.0 20.0 7722-76-1 5 mg/m<br>2.7289 10000.0 20.0 7722-76-1 5 mg/m<br>150 170 180 190 190 190   | 230    |      | 130   |     | ຜ.<br>ວ  |            | 2.074 sec]:58 |                                      |   | 00.02  | us (P)  | R                           |
| Hric Acid<br>Frite Acid<br>Formulated By: Lawrence Ba<br>Formulated By: Pedro L. Ren<br>Expanded<br>Actual Uncertainty (Solvent Safety Inf<br>eight (g) Conc. (ug/mL) - 4/- (ug/mL) CAS# OSHA PEL<br>2.7289 10000.0 20.0 7722-76-1 5 mg/m<br>2.7289 10000.0 1722-76-1 5 mg/m<br>160 170 180 190 190  | 240    |      | 140   |     | <b>4</b> |            | 3115.D# [Cot  |                                      | Uncertainty Assay<br>Purity (%) (%)                         | 2%<br>Balance Uncertainty<br>Flask Uncertainty   | Solvent:  | 22/09/12                    |
| Formulated By: Lawrence Ba<br>Formulated By: Lawrence Ba<br>Reviewed By: Pedro L. Ren<br>Conc. (ug/m), -/- (ug/m), CAS# OSHA PEL<br>10000.0 20.0 7722-76-1 5 mg/m<br>10000.0 20.0 7722-76-1 5 mg/m<br>10000.0 eio eio  | 250    |      | 150   |     | S<br>O   |            | ınt] [Linear] |                                      |   |  |   |                             |
| Formulated By: Lawrence Ba<br>Formulated By: Pedro L. Ren<br>Expanded SDS Inf<br>Uncertainty (Solvent Safety Inf<br>+/- (ug/mL) CAS# OSHA PEL (<br>20.0 7722-76-1 5 mg/m<br>20.0 7722-76-1 5 mg/m<br>20.0 190 90   | 260    |      |       |     |          |            |               | 2.7289 10000.                        | Actual Actual<br>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<br>(Solvent Saf<br>CAS# OSH/                             | Ped  | Gerence /   |                             |
| .hed pg.)<br>LbS0<br>LbS0  |        |      |       |     |          |            |               |                                      | <b>DS Information</b><br>fety Info. On Attac<br>A PEL (TWA) | L. Rentas  | Jan   | https://At                  |
| g 3186 SRM   |        |      | 9     |     | J        |            |               |                                      | 0   | 041723<br>041723   |   | tps://Absolutestandards.com |

| <b>Abs</b> | Absolute (<br>800-368-1131<br>www.absolute                    | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com | <b>lards</b> ,<br>ds.com                                      | Inc.   | -   |   |   |  | ĉ   | rtified Re   | eren                               | Certified Reference Material CRM                  | ial CR                         | M   |                     |                        |             |                               | https<br>AF   | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com | 4 Accredited<br>cate Number<br>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                  | <b>A</b> 2             | ŧ           | AB                            | W             |  |  |
|            |   | A.22  | 5<br>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<br>8<br>8  | <u>ନ</u> ଜ  | 40.02<br>20   | 부 부   | 40.02<br>20  | Mg  | 40.01<br>002   | r S                                | A A 8   | ₽ ₽                            | A A<br>3 S  | Å.                  | A) 02                  | <b>1</b> 11 | A 600                         | \$ <          | 8 8  |  |
|            |   | 10.0>   | ព្  | <0.02  | ណ្ឌ   | <0.02   | 장   | <0.2   | Hg  | 40.2   | שי                                 | T   | R Q                            | 40.02   | K 2                 | 8.8<br>2               |             | <0.02                         | 4 'B          | 60.02<br>20.02   |  |
|            | B   | 8 8<br>22<br>22   | 5 S   | 8 8<br>22<br>22  | ନ ଅ   | 40.02<br>20   | 32  | 4 4 A  | N W   | 4 4<br>8<br>8  | * 7                                | A0.02   | s s                            | A A<br>3 S  | , s                 | 88                     | 1 S         | <b>A A A A</b>                | 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<br>Purified   | rtified va<br>l acids,  | alue is<br>18.2 m   | The certified value is the concen<br>Purified acids, 18.2 megohm dei<br>the menantion of all standards | centrat<br>deioniz  | tion calcul<br>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<br>s A gla                               | and volu   | metric<br>nd the                   | measure<br>highest p                              | nents<br>Jurity r              | unless oth<br>aw mater  | nerwisc<br>ials are | e stated.<br>9 used in |             |                               |               |  |  |
| * * * * *  | All star<br>Standa<br>Standa<br>All Star<br>Uncerta<br>Measur | ndard co<br>rds are  <br>rds are  <br>ndards s<br>ainty Re<br>rement  | ntaine<br>prepare<br>certife<br>hould I<br>ference<br>Result, | rs are me<br>ad gravin<br>d (+/-) 0<br>es storec<br>e: Taylor<br>" NIST Te                             | eticulo<br>netrica<br>).5% o<br>d with<br>r, B.N.<br>echnic | ally using<br>the stat<br>caps tigh<br>and Kuya<br>al Note 1; | hed pri<br>balanc<br>iced val<br>it and<br>it, C.E.<br>297, L | <ul> <li>* All standard containers are meticulously cleaned prior to use.</li> <li>* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).</li> <li>* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.</li> <li>* All Standards should be stored with caps tight and under appropriate laboratory conditions.</li> <li>* 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).</li> </ul> | e calit<br>other<br>ropriat<br>nes for<br>nment | brated wit<br>wise stat<br>te laborat<br>Evaluatir<br>Printing ( | h weig<br>ed.<br>ory co<br>Office, | )hts trace<br>onditions.<br>Expressir<br>Washingt | able to<br>og the l<br>on, D.( | to NIST (see above).<br>e Uncertainty of NIST<br>D.C. (1994). | e abov<br>ty of N   | e).<br>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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|   | -                 | 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                   | <b>40</b>                                | 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                                  | IN1  | 1. Ammonium sulfate (S)  |
| Expanded SDS Information<br>Uncertainty (Solvent Safety Info. On Attached pg.) NIST<br>+/- (ug/mL) CAS# OSHA PEL (TWA) LDSO SRM | (g) Conc. (µg/mL) | Actual<br>Weight (g) | Target<br>Weight (g) | Uncertainty Assay<br>Purity (%) (%)      | Purity<br>(%) | Nominal<br>Conc. (µg/mL)  | Lot.<br>Number                                   | RM#  | Compound   |
| i By: Ped   | [F                |                      |                      | Balance Uncertainty<br>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<br>Ambient (20 °C)<br><b>10000</b><br>Sum | Expiration Date:<br>nended Storage:<br>htration (µg/mL):<br>%T Test Number:  | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Teet Number |
| around Bring  | Type 1 Water      | ASTM Ty              | Lot#<br>071123       | Solvent:                                 |               | E)                        | 57116<br>071123<br>Sulfur (S)                    | <u>PORT:</u><br>Part Number:<br>Lot Number:<br>Description:  | CERTIFIED WEIGHT REPORT:<br>Part N<br>Lot N<br>Desc  |
| ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com  | CRM               |                      | ference M            | Certified Reference Material             | R a           |                           |  | om   | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                          |
|   |                   |                      |                      |  |               |                           |  | And in case of the local division of the loc |  |

| 800-368-1131<br>www.absolutestandards.com   |  | 0   | Certified Reference Material CRM   | nce Material C  | RM  |                         |           | •          | ANAB ISO 1:<br>AR-1539 Ce<br>https://Absolut | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>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<br>Ca   |  | 40.02   | 40.02<br>40.02   | Ni <0.02<br>Nb <0.02  | Pr <0.02<br>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<br>40.02  | Fe <0.2 Hg  | A A<br>3 12  | 8 8   |   |                         | 12 1      |            | 40.02 Y 40.02                                | 40.02<br>20.02   |
| B (UUZ CI 40,02   | Au <0.02   | <0.02   | <0.02  |   | Sc <0.02  | Ta o                    | <0.02     |            | 40.02<br>21<br>21<br>40                      | 40.02  |
| Physical Characterization:  |  |   | (T)= Target analyte  | alyte   |   |                         |           | ۲<br>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.   |  |
| <ul> <li>* The certified value is the concentration calculated from gravimetric and volumetric measurements</li> <li>* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity in the preparation of all standards.</li> <li>* All standard containers are meticulously cleaned prior to use the preparation of the preparation of all standards.</li> </ul>   | ntration calculate<br>ionized water, ca  | d from gravimetri<br>librated Class A g   | c and volumetric<br>lassware and the   | c measurement<br>highest purity                                     | s unless otherwise stated.<br>raw materials are used in | ise state<br>are used i | 5.6       |            |  |  |
| * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).<br>* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.  | trically using bala<br>% of the stated   | value, unless othe  | brated with weighwise stated.  | phts traceable :  | to NIST (see ab   | ove).                   |           |            |  |  |
| * Uncertainty Reference: Taylor,<br>Measurement Result," NIST Tec   | vith caps tight ar<br>B.N. and Kuyat, (<br>hnical Note 1297  | id under appropria<br>2.E., "Guidelines fc<br>, U.S. Governmen  | ite laboratory co<br>r Evaluating and<br>t Printing Office,  | I Expressing the<br>Washington, D                                   | <sup>9</sup> Uncertainty of NIST<br>).C. (1994).        | F NIST                  |           |            |  |  |
|   | ·  |   |  |   |   |                         |           |            |  |  |
|   |  | ð   |  |   |   |                         |           |            |  |  |
| * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to<br>* Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.<br>* All standards should be stored with caps tight and under appropriate laboratory conditions.<br>* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the<br>Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D. | itrically using bail<br>trically using bail<br>is of the stated<br>with caps tight ar<br>B.N. and Kuyat, (<br>hnical Note 1297 | prior to use.<br>ances that are cali<br>value, unless othe<br>d under appropria<br>2.E., "Guidelines fo<br>, U.S. Governmen | brated with weig<br>rwise stated.<br>re laboratory co<br>or Evaluating and<br>t Printing Office,<br>t Printing Office, | ghts traceable .<br>onditions.<br>I Expressing the<br>Washington, D | to NiST (see ab<br>3 Uncertainty o<br>).C. (1994).      | ove).<br>F NIST         |           |            |  |  |

2 of 2

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| m/z->       | បា<br>O<br>ញ<br>បា | m/z->       | 1.0E6 | ₩Z->             | 5000<br>[1] S                         | 1. Ammonium hexafluorosilicate (Si)  | Weight shown bel                                    | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):<br>NIST Test Number: | <u>CERTIFIED WEIGHT REPORT:</u><br>Part Number:<br>Lot Number:<br>Description: | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com                    |
|-------------|--------------------|-------------|-------|------------------|---------------------------------------|--|---|---|--|--|
| 210 220     |                    | 110 120     |       | 0<br>0           | [1] Spectrum No.1 [ 31.               | RM# Number<br>IN009 SID082022A1  | s diluted to (mL):                                  | 1 Date: 122026<br>prage: Ambient (20 °C)<br>g/mL): 1000<br>umber: 6UTB                          | mber: <u>57014</u><br>mber: <u>122023</u><br>ptlon: <u>Silicon (Si)</u>        | ت<br>ب   |
| 230 240 250 |                    | 130 140 150 |       | 4<br>0<br>8<br>0 | 31.393 sec]:58014.D# [Count] [Linear] | Canc. (µg/mL) (%) Purity (%) (%) Weight (g)<br>1000 99.999 0.10 14.4 13.8854 | 0.058 Flask Uncertainty<br>Purity Uncertainty Assay | 2% 40.0<br>(mL)<br>5E-05 Balance Uncertainty  | 12   | Certified Reference Material CRM   |
| N<br>O<br>O |                    | 160 170     |       | 80               |                                       | Weight (g) Conc. (µg/mL)<br>13.8855 1000.0                                   | Actual Actual                                       | Nitric Acid   | Nitric A   | Material CRM   |
|             |                    | 180 190     |       | 80<br>00         |                                       | +/- (µg/mL) CAS# OSHA PEL (TWA)<br>2.0 16919-19-0 2.5 mg/m3                  | 9,  | 8   | Aleah & Brack  | <b>P</b>   |
|             |                    | 2000        |       | 100              |                                       |  | Solvent Safety Info. On Attached pg.) NIST          |   | A.   | ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.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);

|     |       |            |       |                      |       |              | Trace M  | etals | Verifica           | ition | by ICP-N | E<br>S | ia/mL) |      |                         |                   |                             |                         |               |
|-----|-------|------------|-------|----------------------|-------|--------------|--|-------|--------------------|-------|----------|--------|--------|------|-------------------------|-------------------|-----------------------------|-------------------------|---------------|
|     |       |            |       | A COLUMN TO A COLUMN |       |              | Contraction of the local distance of the loc |       | Contraction of the |       |          |        |        |      | No. of Concession, Name | <b>UNIVERSITY</b> | A REAL PROPERTY AND INCOME. | No. of Concession, Name | STOLEN STOLEN |
| A   | <0.02 | 8          | <0.02 | Dy                   | <0.02 | Hf           | <0.02  | Ľ     | <0.02              | N     | 40.02    | Pr     | <0.02  | Se   | <0.2                    | 7                 | 4) 02                       | W                       | AND           |
| S   | 40.02 | ç          | e,    | Į                    | 3     | ç            | 3  | -     | 3                  | ,     |          | 1      |        |      |                         | •0                | 1000                        | -                       | 70.02         |
| : 8 |       | ) <u>(</u> | 101   | R                    | 20.02 | OL           | <0.02  | Ę     | <0.02              | ß     | <0.02    | Re     | <0.02  | ŝ    | ч                       | ē                 | <0.02                       | q                       | <0.02         |
| 25  | 202   | ຣ          | <0.02 | 5                    | 40.02 | F            | 40.02  | Mg    | <0.01              | ç     | 40.02    | R      | A).02  | Ag   | 40.02                   | 1                 | 4033                        | <                       | 3             |
| Ba  | 40.02 | ຊ          | <0.02 | ନ୍ଥ                  | 40,02 | <b>-</b> -1' | 3  | \$    | 3                  | ž     | 23       | P      | 3      | 4    |                         | 1                 |                             |                         |               |
| đ   | 5     | 2          | 5     | >                    |       | 1            |  |       |                    |       |          | 200    | 20.00  | TAG. | 101                     | 10                | 20.02                       | 10                      | 20.02         |
| Į   | TOTON | 5          | <0.02 | G                    | 20.02 | re           | 40.2   | Нg    | 40.2               | 'n    | 40.02    | Ru     | <0.02  | \$   | <b>A</b> 0.02           | 5                 | 40.02                       | ~                       | 4) M          |
| Bl  | 40.02 | S          | <0.02 | ନ୍ନ                  | A)02  | 5            | 40.02  | Mo    | 40.02              | ¥     | 40.03    | 2      | 2002   | 2    | 3                       | 2                 | 3                           | 2                       | 3             |
| 7   | 33    | 2          | 3     | Å.,                  | 3     | Ż            | 3  |       | 2                  | 1 ;   |          |        |        | ,    | 10.02                   | 22                | 10.04                       |                         | 20.05         |
| F   | -UNE  | 2          | 10.02 | 70                   | 20.02 | 10           | 20.02  | Nd    | AU.U2              | ×     | 40.2     | 8      | <0.02  | Ta   | 40.02                   | H                 | 40.02                       | 2                       | <0.02         |

(T) = Target analyte

**Physical Characterization:** 

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

Son P. Shr

Certified by:

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

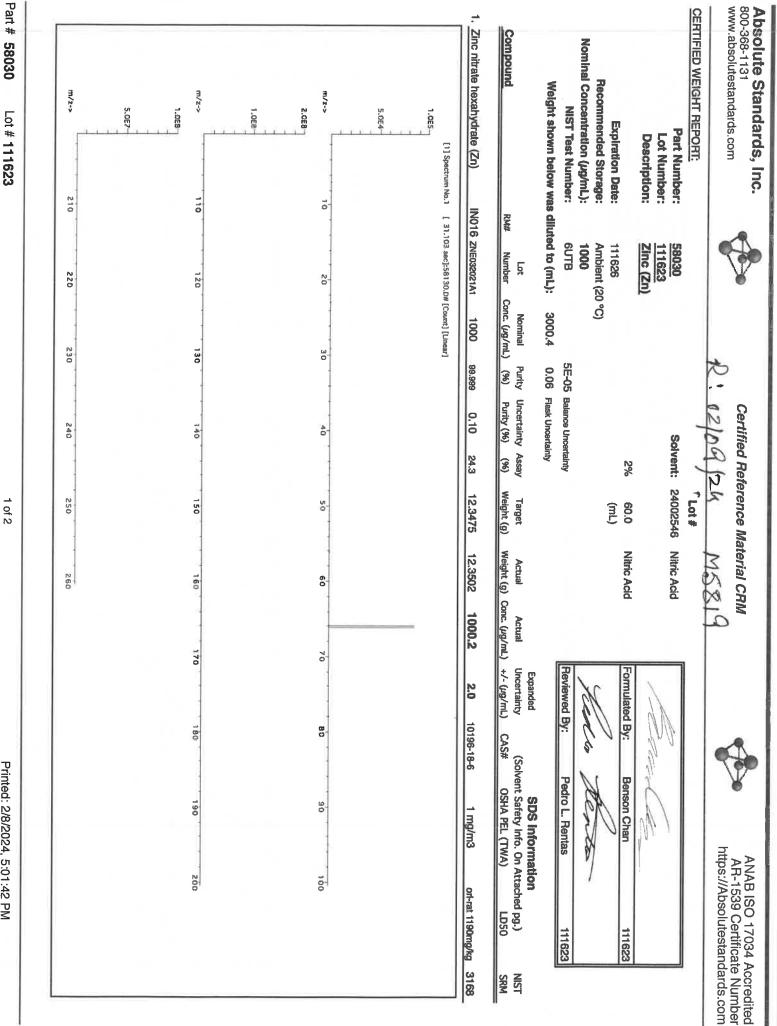
\* All standard containers are meticulously cleaned prior to use.

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

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

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Part # 57014 Lot # 122023



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| ww.a                   | 0-36    | bsc          |
|------------------------|---------|--------------|
| bsol                   | -368-11 | <b>X</b> ute |
| /w.absolutestandards.c | 131     |              |
| and                    |         | Stan         |
| ards                   |         | dal          |
| ŝ                      |         | rds.         |
|                        |         | Inc          |

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**Certified Reference Material CRM** 



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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

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

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

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

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

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

Part # 58030 Lot # 111623

| Printed: 9/21/2022, 11:20:01 PM   | 1 of 2                                      |  |  | Part # 56138 Lot # 082922   |
|---|---|--|--|---|
| 20<br>0   | 250   | 240  | 220 230  | m/z-> 210   |
|   |   |  |  | N 0<br>5 0<br>П П<br>0 б  |
| 160 170 180 190 200   | 150 1                                       | 0 140  | 120 130  | m/z-> 110   |
|   |   |  |  | 5.<br>0<br>E<br>5   |
| 60 70 80 90 100   | 50  | 40   | 20 30  | m/z-> 10  |
|   |   |  |  | N.5E6   |
|   | unt] [Linear]                               | 14.495 sec]:58138.D# [Count] [Linear]                | _  | [1] Speatrum No.1<br>5.0E6  |
| 10000.1 20.0 10042-76-9 NA orf-rat >2000mg/kg 3   |   | 99.997 0.10  | 7 SRZ022018A1  | trate (Sr)  |
| Expanded <b>SDS Information</b><br>Actual Actual Uncertainty (Solvent Safety Info. On Attached pg.) NIST<br>Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LD50 SRM | Target<br>Weight (g)                        |  | Lot Nominal<br>RM# Number Conc. (µg/mL)                | Compound  |
| Reviewed By: Pedro L. Rentas 082922   |   | 5E-05 Balance Uncertainty<br>0.058 Flask Uncertainty | 6018<br>diluted to (mL): 1000.12                       | Weight shown below was diluted to (mL):   |
| Nuic Acid Formulated by: Lawrence barry 082922  | (mL)  | 6<br>1   | 082925<br>Ambient (20 °C)<br><b>10000</b>              | Expiration Date:<br>Recommended Storage:<br>Nominal Concentration (µg/mL):                        |
| Advance Bary  | 20510011                                    | Solvent:   | <u>56138</u><br><u>082922</u><br><u>Strontium (Sr)</u> | Part Number:<br>Lot Number:<br>Description:   |
| I CRM<br>ANAB ISO 17034 Accredited<br>AR-1539 Certificate Number<br>https://Absolutestandards.com   | Certified Reference Material CRM<br>いままのション | Certified Ref<br>এ৯।।১।২३ শ                          | R:   | Absolute Standards, Inc.<br>800-368-1131<br>www.absolutestandards.com<br>CERTIFIED WEIGHT REPORT: |

| vww.absolutestandards.com | 300-368-1131 | 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 Spectroscopy (ICP-MS):

|    |       |    |       |     |       |    | race Me | tais | Verifica | TION     | by ICP- | MC<br>( | hd/mr) |    |       |    |        |    |  |
|----|-------|----|-------|-----|-------|----|---------|------|----------|----------|---------|---------|--------|----|-------|----|--------|----|--|
|    |       |    |       |     | 10-31 |    |         |      |          |          |         |         |        |    | 10 T  |    | 101000 |    | No. of Concession, No. of Conces |
| AI | <0.02 | Cd | <0.02 | Dy  | <0.02 | Hf | <0.02   | Ε.   | <0.02    | <u>N</u> | <0.02   | Pr      | <0.02  | Se | <0.2  | Tb | <0.02  | W  | <0.02  |
| SР | <0.02 | Ca | <0.2  | 막   | <0.02 | Но | <0.02   | Lu   | <0.02    | Nb       | <0.02   | Re      | <0.02  | ŝ  | <0.02 | Te | A0.02  | ď  | <0.02  |
| As | <0.2  | ĉ  | <0.02 | F   | <0.02 | ľ  | <0.02   | Mg   | <0.01    | õ        | <0.02   | Rh      | <0.02  | Ag | <0.02 | Ц  | <0.02  | <  | <0.02  |
| Ba | <0.02 | ß  | <0.02 | ନ୍ଦ | <0.02 | F  | <0.02   | M'n  | < 0.02   | Pd       | <0.02   | RЬ      | <0.02  | Na | <0.2  | Ţ  | <0.02  | ΥЪ | <0.02  |
| Be | <0.01 | Ω  | <0.02 | Ga  | <0.02 | F  | <0.2    | Hg   | <0.2     | P        | <0.02   | Ru      | <0.02  | Sr | Ţ     | Tm | <0.02  | Y  | <0.02  |
| Bi | <0.02 | ĉ  | <0.02 | Ge  | <0.02 | La | <0.02   | Mo   | <0.02    | Ŗ        | <0.02   | Sm      | <0.02  | s  | <0.02 | Sn | <0.02  | Zn | <0.02  |
| в  | <0.02 | Cu | <0.02 | Au  | <0.02 | РЪ | <0.02   | Nd   | <0.02    | ĸ        | <0.2    | Sc      | <0.02  | Ta | <0.02 | H  | <0.02  | Zr | <0.02  |

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

(T)= Target analyte

Physical Characterization:

Certified by:

Sur & Sur

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

the preparation of all standards.

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

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

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

Part # 56138 Lot # 082922