

Prep Standard - Chemical Standard Summary

Order ID : Q1235

Test : Corrosivity, Ignitability, Paint Filter, Percent Solids, Reactive Cyanide, Reactive Sulfide

Prepbatch ID : PB166422, PB166486,

Sequence ID/Qc Batch ID: LB134491, LB134499, LB134500, LB134502, LB134524,

Standard ID :

WP110103, WP111004, WP111035, WP111294, WP111296, WP111746, WP111747, WP111748, WP111749, WP111750, WP111751, WP111752, WP111753, WP111754, WP111755,

Chemical ID :

M6121, W2668, W2725, W2882, W2926, W3019, W3071, W3072, W3093, W3094, W3105, W3107, W3112, W3113, W3114, W3138, W3139, W3149, W3154, W3161,



| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|--|-------------|--------------------------|------------------|------------------------|--------------------|----------------------------------|------------------|--------------------------------|
| 539 | CN BUFFER | WP110103 | 10/08/2024 | 04/08/2025 | Rubina Mughal | WETCHEM_S CALE_5 (WC SC-5) | None | Iwona Zarych 10/08/2024 |
| <u>FROM</u> 138.00000gram of W2668 + 862.00000ml of W3112 = Final Quantity: 1000.000 ml | | | | | | | | |

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|--|-------------------|--------------------------|------------------|------------------------|--------------------|---------------------------|------------------------|----------------------------|
| 160 | 0.5M ZINC ACETATE | WP111004 | 12/09/2024 | 05/13/2025 | Rubina Mughal | WETCHEM_SCALE_8 (WC SC-7) | WETCHEM_PIPETTE_3 (WC) | Iwona Zarych 12/09/2024 |
| <u>FROM</u> 0.88900L of W3112 + 1.00000ml of M6121 + 110.00000gram of W2926 = Final Quantity: 1000.000 ml | | | | | | | | |

[illegible]

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|---|--|--------------------------|------------------|------------------------|--------------------|---------------------------|------------------|----------------------------|
| 11 | Sodium hydroxide absorbing solution 0.25 N | WP111294 | 01/07/2025 | 07/07/2025 | Niha Farheen Shaik | WETCHEM_SCALE_5 (WC SC-5) | None | Iwona Zarych 01/07/2025 |
| <u>FROM</u> 21.00000L of W3112 + 210.00000gram of W3113 = Final Quantity: 21.000 L | | | | | | | | |

Wet Chemistry STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|----------------------------------|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 3371 | Cyanide LCS Spike Solution, 5PPM | WP111296 | 01/07/2025 | 07/07/2025 | Niha Farheen Shaik | None | WETCHEM_FIPETTE_3 (WC) | Iwona Zarych 01/07/2025 |

FROM 1.00000ml of W3138 + 199.00000ml of WP111294 = Final Quantity: 200.000 ml

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 3456 | Cyanide Intermediate Working Std, 5PPM | WP111746 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_FIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |

FROM 0.25000ml of W3154 + 49.75000ml of WP111294 = Final Quantity: 50.000 ml

Wet Chemistry STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|------------------------------|--------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 4 | Calibration standard 500 ppb | WP111747 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | None | Iwona Zarych |
| | | | | | | | | 02/04/2025 |

FROM 45.00000ml of WP111294 + 5.00000ml of WP111746 = Final Quantity: 50.000 ml

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|-------------------------------------|--------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------|
| 3761 | Calibration-CCV CN Standard 250 ppb | WP111748 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | None | Iwona Zarych |
| | | | | | | | | 02/04/2025 |

FROM 2.50000ml of WP111746 + 47.50000ml of WP111294 = Final Quantity: 50.000 ml



| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 6 | Calibration Standard 100 ppb | WP111749 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_FIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |
| <u>FROM</u> | 1.00000ml of WP111746 + 49.00000ml of WP111294 = Final Quantity: 50.000 ml | | | | | | | |

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 7 | Calibration Standard 50 ppb | WP111750 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_PIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |
| <u>FROM</u> | 0.50000ml of WP111746 + 49.50000ml of WP111294 = Final Quantity: 50.000 ml | | | | | | | |



| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 8 | Calibration Standard 10 ppb | WP111751 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_PIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |
| <u>FROM</u> | 1.00000ml of WP111747 + 49.00000ml of WP111294 = Final Quantity: 50.000 ml | | | | | | | |

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|---|--------------------------|--------------------------|------------------|------------------------|--------------------|----------------|------------------|----------------------------|
| 167 | 0 ppb CN calibration std | WP111752 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | None | Iwona Zarych 02/04/2025 |
| <u>FROM</u> 50.00000ml of WP111294 = Final Quantity: 50.000 ml | | | | | | | | |

Wet Chemistry STANDARD PREPARATION LOG

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|----------------------------|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 9 | Calibration Standard 5 ppb | WP111753 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_FIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |

FROM 0.50000ml of WP111747 + 49.50000ml of WP111294 = Final Quantity: 50.000 ml

| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|----------------------|--------------------------|------------------|------------------------|--------------------|----------------|---------------------------|----------------------------|
| 2168 | RCN ICV STD, 100 PPB | WP111754 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | None | WETCHEM_FIPETTE_3 (WC) | Iwona Zarych 02/04/2025 |

FROM 1.00000ml of WP111296 + 49.00000ml of WP111294 = Final Quantity: 50.000 ml



| <u>Recipe ID</u> | <u>NAME</u> | <u>NO.</u> | <u>Prep Date</u> | <u>Expiration Date</u> | <u>Prepared By</u> | <u>ScaleID</u> | <u>PipetteID</u> | <u>Supervised By</u> |
|------------------|--|--------------------------|------------------|------------------------|--------------------|-------------------------|------------------|----------------------------|
| 1582 | Chloramine T solution, 0.014M | WP111755 | 02/03/2025 | 02/04/2025 | Niha Farheen Shaik | WETCHEM_SCALE_5 (WCS-5) | None | Iwona Zarych 02/04/2025 |
| <u>FROM</u> | 0.08000gram of W3139 + 20.00000ml of W3112 = Final Quantity: 20.000 ml | | | | | | | |

CHEMICAL RECEIPT LOG BOOK

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|------------------|---|------------|-----------------|-------------------------|-----------------------------|----------------|
| Seidler Chemical | BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L) | 0000275677 | 05/13/2025 | 11/13/2024 / Eman | 10/13/2024 / Eman | M6121 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|------------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | J3818-5 / SODIUM PHOSPHATE, MONOBAS/HYD, CRYST, ACS, 2.5 KG | 0000225799 | 12/03/2025 | 04/05/2021 / Alexander | 02/10/2020 / apatel | W2668 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|-------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | EMD-FX0410-5 / FORMALDEHYDE SOLUTION 450ML | 60045 | 06/22/2025 | 08/19/2024 / lwona | 06/22/2020 / apatel | W2725 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|--------------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | EM-BX0035-3 / Barbituric Acid, 100 gms | 1.00132.0100 | 04/30/2025 | 12/07/2021 / | 11/30/2021 / apatel | W2882 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|--------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | J4296-1 / ZINC ACETATE, DIHYD, CRYST, ACS, 500G | 383058 | 07/05/2027 | 07/05/2022 / ketankumar | 07/05/2022 / ketankumar | W2926 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|---------------|-------------------------|----------|-----------------|-------------------------|-----------------------------|----------------|
| SIGMA ALDRICH | 270970-1L / Pyridine 1L | SHBQ2113 | 04/03/2028 | 04/03/2023 / lwona | 04/03/2023 / lwona | W3019 |

CHEMICAL RECEIPT LOG BOOK

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL14455-3 / buffer solution pH 7 yellow | 4308H30 | 07/31/2025 | 01/02/2024 / JIGNESH | 12/06/2023 / Iwona | W3071 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL14940-1 / Buffer Solution, PH12 (500ml) | 2310P21 | 04/30/2025 | 01/02/2024 / JIGNESH | 12/07/2023 / Iwona | W3072 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|----------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | 566002 / BUFFER PH 7.00 GREEN 1PINT PK6 | 44001f99 | 12/31/2025 | 04/03/2024 / jignesh | 04/02/2024 / jignesh | W3093 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | 1601-1 / PH 10.01 BUFFER,COLOR CD 475ML | 4310g83 | 03/31/2025 | 04/03/2024 / jignesh | 04/02/2024 / jignesh | W3094 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL69870-8 / SODIUM THIOSULFATE,0.025N,4LIT RE | 4403S13 | 09/30/2025 | 04/22/2024 / Iwona | 04/22/2024 / Iwona | W3105 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|----------------------------------|-----------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL14055-3 / PH 4 BUFFER SOLUTION | AL14055-3 | 02/27/2026 | 09/05/2024 / jignesh | 05/13/2024 / jignesh | W3107 |

CHEMICAL RECEIPT LOG BOOK

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

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|------------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | PC19510-7 / Sodium Hydroxide Pellets 12 Kg | 23B1556310 | 12/31/2025 | 07/08/2024 / lwona | 07/08/2024 / lwona | W3113 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--------------------------------------|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL35830-4 / IODINE SOLUTION .025N 1L | 2405D89 | 05/31/2025 | 07/10/2024 / lwona | 07/10/2024 / lwona | W3114 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|----------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | LC135457 / Cyanide Standard, 1000 PPM, Second Source | 44080060 | 01/30/2025 | 09/06/2024 / lwona | 08/28/2024 / lwona | W3138 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|-------------------------------------|----------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | JTE494-6 / CHLORAMINE-T BAKER 250GM | 10239484 | 09/09/2029 | 09/09/2024 / lwona | 09/09/2024 / lwona | W3139 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|---------------------------------|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL70850-8 / Starch Solution, 4L | 4408P62 | 08/31/2026 | 10/16/2024 / lwona | 10/16/2024 / lwona | W3149 |

CHEMICAL RECEIPT LOG BOOK

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|------------------------------------|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | RC2543-4 / CYANIDE STD 1000PPM 4OZ | 1411J58 | 05/31/2025 | 12/02/2024 / Iwona | 12/02/2024 / Iwona | W3154 |

| Supplier | ItemCode / ItemName | Lot # | Expiration Date | Date Opened / Opened By | Received Date / Received By | Chemtech Lot # |
|-----------------------------|--|---------|-----------------|-------------------------|-----------------------------|----------------|
| PCI Scientific Supply, Inc. | AL13850-1 / Buffer Solution, PH2 (500ml) | 2411E26 | 10/31/2026 | 12/09/2024 / Iwona | 12/09/2024 / Iwona | W3161 |

W3071
Rec 12/6/23

Certificate of Analysis 12

Buffer, Reference Standard, pH 7.00 ± 0.01 at 25°C (Color Coded Yellow)

Lot Number: 4308H30

Product Number: 1551

Manufacture Date: AUG 09, 2023

Expiration Date: JUL 2025

The certified value for this product is confirmed in independent testing by a second qualified chemist.

The NIST traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

| | | | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|------|------|
| °C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| pH | 7.12 | 7.09 | 7.06 | 7.04 | 7.02 | 7.00 | 6.99 | 6.98 | 6.98 | 6.97 | 6.97 |

| Name | CAS# | Grade |
|--------------------------------|-------------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Sodium Phosphate Dibasic | 7558-79-4 | ACS |
| Potassium Dihydrogen Phosphate | 7778-77-0 | ACS |
| Preservative | Proprietary | |
| Yellow Dye | Proprietary | |
| Sodium Hydroxide | 1310-73-2 | Reagent |

| Test | Specification | Result |
|------------|---------------|--------|
| Appearance | Yellow liquid | Passed |

*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 7.002 | 0.02 | 186-I-g, 186-II-g, 191d |

| Specification | Reference |
|-----------------------------|-----------------|
| Commercial Buffer Solutions | ASTM (D 1293 B) |
| Buffer A | ASTM (D 5464) |
| Buffer A | ASTM (D 5128) |

pH measurements were performed in our Batesville, IN laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.02) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1551-2.5 | 10 L Cubitainer® | 24 months |
| 1551-5 | 20 L Cubitainer® | 24 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Paul Brandon (08/09/2023)

Production Manager

This document is designed to comply with ISO Guide 31 "Reference Materials --
Contents of Certificates and Labels."

This product was tested in an ISO 17025 Accredited Laboratory

This test report shall not be reproduced, except in full, without the written approval of Ricca Chemical Company.

W3019
rec 4/3/23

3050 Spruce Street, Saint Louis, MO 63103, USA

Website: www.sigmaaldrich.comEmail USA: techserv@sial.comOutside USA: eurtechserv@sial.com

Certificate of Analysis

Product Name:

Pyridine - anhydrous, 99.8%

Product Number:

270970

Batch Number:

SHBQ2113

Brand:

SIAL

CAS Number:

110-86-1

MDL Number:

MFCD00011732

Formula:

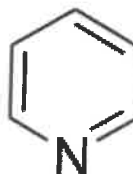
C₅H₅N

Formula Weight:


79.10 g/mol

Quality Release Date:

15 DEC 2022



| Test | Specification | Result |
|-------------------------|-----------------------|------------|
| Appearance (Color) | Colorless | Colorless |
| Appearance (Form) | Liquid | Liquid |
| Infrared Spectrum | Conforms to Structure | Conforms |
| Purity (GC) | ≥ 99.75 % | 99.99 % |
| Water (by Karl Fischer) | ≤ 0.003 % | 0.002 % |
| Residue on Evaporation | ≤ 0.0005 % | < 0.0001 % |


Larry Coers, Director
Quality Control
Sheboygan Falls, WI US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.



**RICCA CHEMICAL COMPANY®**

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customerservice@riccachemical.com

W 3072
REC. 12/01/23
12

Certificate of Analysis

Buffer, Reference Standard, pH 12.00 ± 0.01 at 25°C**Lot Number: 2310P21****Product Number: 1615****Manufacture Date: OCT 24, 2023****Expiration Date: APR 2025**

The certified value for this product is confirmed in independent testing by a second qualified chemist.

| | | | | | | |
|----|-------|-------|-------|-------|-------|-------|
| °C | 15 | 20 | 25 | 30 | 35 | 40 |
| pH | 12.35 | 12.17 | 11.99 | 11.78 | 11.62 | 11.46 |

| Name | CAS# | Grade |
|--------------------|-----------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Potassium Chloride | 7447-40-7 | ACS |
| Sodium Hydroxide | 1310-73-2 | Reagent |

| Test | Specification | Result |
|------------|------------------|--------|
| Appearance | Colorless liquid | Passed |

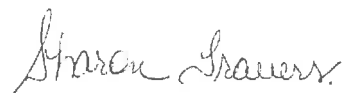
*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 12.005 | 0.02 | 186-I-g, 186-II-g, 191d |

pH measurements were performed in our Pocomoke City, MD laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.01) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1615-1 | 4 L natural poly | 18 months |
| 1615-16 | 500 mL clear PET-G | 18 months |
| 1615-32 | 1 L natural poly | 18 months |
| 1615-5 | 20 L Cubitainer® | 18 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Sharon Travers (10/24/2023)

Operations Manager

This document is designed to comply with ISO Guide 31 "Reference Materials --
Contents of Certificates and Labels."

This product was tested in an ISO 17025 Accredited Laboratory

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Certificate of Analysis

Date of Release: 2/26/2020

Name: Formaldehyde Solution
GR ACS
Meets ACS Specifications

Item No: FX0410 all size codes

Lot / Batch No: 60045

Country of Origin: USA

| Characteristic | Requirement | | Results | Units |
|----------------------------|-------------|-------|-------------|-------|
| | Min. | Max. | | |
| Assay | 36.5 | 38.0 | 36.71 | % |
| Chloride (Cl) | | 5 | <5 | ppm |
| Color (APHA) | | 10 | <10 | |
| Form | | | Passes test | |
| Heavy metals (as Pb) | | 5 | <5 | ppm |
| Iron (Fe) | | 5 | 0.6 | ppm |
| Residue after ignition | | 0.005 | <0.0050 | % |
| Sulfate (SO ₄) | | 0.002 | <0.0020 | % |
| Titration acid | | 0.006 | <0.0060 | meq/g |

Heather Sinn,

Quality Control Manager

This document has been produced electronically and is valid without a signature.

EMD Millipore Corporation, an affiliate of Merck KGaA, Darmstadt, Germany
290 Concord Road
Billerica, MA 01821
U.S.A

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the U.S. and Canada.

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

avantor™



R → 16/13/24
Met dig

M 6121

Material No.: 9530-33
Batch No.: 0000275677
Manufactured Date: 2020/12/16
Retest Date: 2025/12/15
Revision No: 1

Certificate of Analysis

| Test | Specification | Result |
|---|---------------|---------|
| ACS – Assay (as HCl) (by acid-base titrn) | 36.5 – 38.0 % | 37.6 |
| ACS – Color (APHA) | ≤ 10 | 5 |
| ACS – Residue after Ignition | ≤ 3 ppm | 1 |
| ACS – Specific Gravity at 60°/60°F | 1.185 – 1.192 | 1.190 |
| ACS – Bromide (Br) | ≤ 0.005 % | < 0.005 |
| ACS – Extractable Organic Substances | ≤ 5 ppm | 1 |
| ACS – Free Chlorine (as Cl ₂) | ≤ 0.5 ppm | < 0.5 |
| Phosphate (PO ₄) | ≤ 0.05 ppm | < 0.03 |
| Sulfate (SO ₄) | ≤ 0.5 ppm | < 0.3 |
| Sulfite (SO ₃) | ≤ 0.8 ppm | 0.3 |
| Ammonium (NH ₄) | ≤ 3 ppm | < 1 |
| Trace Impurities – Arsenic (As) | ≤ 0.010 ppm | < 0.003 |
| Trace Impurities – Aluminum (Al) | ≤ 10.0 ppb | < 0.2 |
| Arsenic and Antimony (as As) | ≤ 5 ppb | < 3 |
| Trace Impurities – Barium (Ba) | ≤ 1.0 ppb | < 0.2 |
| Trace Impurities – Beryllium (Be) | ≤ 1.0 ppb | < 0.2 |
| Trace Impurities – Bismuth (Bi) | ≤ 10.0 ppb | < 1.0 |
| Trace Impurities – Boron (B) | ≤ 20.0 ppb | < 5.0 |
| Trace Impurities – Cadmium (Cd) | ≤ 1.0 ppb | < 0.3 |
| Trace Impurities – Calcium (Ca) | ≤ 50.0 ppb | 29.7 |
| Trace Impurities – Chromium (Cr) | ≤ 1.0 ppb | < 0.4 |
| Trace Impurities – Cobalt (Co) | ≤ 1.0 ppb | < 0.3 |
| Trace Impurities – Copper (Cu) | ≤ 1.0 ppb | < 0.1 |
| Trace Impurities – Gallium (Ga) | ≤ 1.0 ppb | < 0.2 |

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

Avantor Performance Materials, LLC

100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700

Material No.: 9530-33

Batch No.: 0000275677

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

For Laboratory, Research or Manufacturing Use

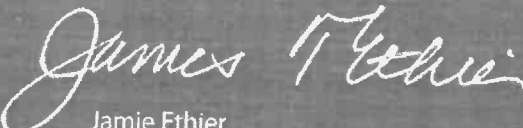
Product Information (not specifications):

Appearance (clear, fuming liquid)

Meets ACS Specifications

Country of Origin: US

Packaging Site: Phillipsburg Mfg Ctr & DC



Jamie Ethier
Vice President Global Quality

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

Avantor Performance Materials, LLC

100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700



Certificate of Analysis

1.00132.0000 Barbituric acid for analysis EMSURE®
Batch N020065932

| | Spec. Values | | Batch Values | |
|--|--------------|-----|--------------|-----|
| Assay (acidimetric) | ≥ 99 | % | 99.6 | % |
| Identity (IR-spectrum) | passes test | | passes test | |
| Chloride (Cl) | ≤ 40 | ppm | ≤ 40 | ppm |
| Heavy metals (as Pb) | ≤ 50 | ppm | ≤ 50 | ppm |
| Fe (Iron) | ≤ 10 | ppm | ≤ 10 | ppm |
| Sulfated ash | ≤ 0.1 | % | ≤ 0.1 | % |
| Loss on Drying (105 °C) | ≤ 0.1 | % | ≤ 0.1 | % |
| Suitability as reagent (for cyanide determination) | passes test | | passes test | |

Date of release (DD.MM.YYYY) 17.04.2020
Minimum shelf life (DD.MM.YYYY) 30.04.2025

Ioannis Chartomatsidis
Responsible laboratory manager quality control

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Sodium Phosphate, Monobasic, Monohydrate,
Crystal
BAKER ANALYZED® A.C.S. Reagent

(sodium dihydrogen phosphate, monohydrate)



Material No.: 3818-05
Batch No.: 0000225799
Manufactured Date: 2018/12/05
Retest Date: 2025/12/03
Revision No: 1

Certificate of Analysis

Meets ACS Reagent Chemical Requirements,

| Test | Specification | Result |
|--|----------------|-----------|
| Assay ($\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$) | 98.0 – 102.0 % | 99.5 |
| pH of 5% Solution at 25°C | 4.1 – 4.5 | 4.3 |
| Insoluble Matter | ≤ 0.01 % | < 0.01 |
| Chloride (Cl) | ≤ 5 ppm | < 5 |
| ACS – Sulfate (SO_4) | ≤ 0.003 % | < 0.003 |
| Calcium (Ca) | ≤ 0.005 % | < 0.005 |
| Potassium (K) | ≤ 0.01 % | < 0.01 |
| Heavy Metals (as Pb) | ≤ 0.001 % | < 0.001 |
| Trace Impurities – Iron (Fe) | ≤ 0.001 % | < 0.001 |

For Laboratory, Research or Manufacturing Use
Meets Reagent Specifications for testing USP/NF monographs

Country of Origin: IN
Packaging Site: Paris Mfg Ctr & DC


Jamie Ethier
Vice President Global Quality

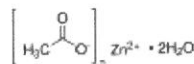
For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700
Avantor Performance Materials, LLC
100 Matsonford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone: 610.386.1700

Certificate of Analysis

Product Name:


Zinc acetate dihydrate - ACS reagent, $\geq 98\%$

Product Number: 383058
Batch Number: MKCQ9159
Brand: SIGALD
CAS Number: 5970-45-6
MDL Number: MFCD00066961
Formula: $C_4H_6O_4Zn \cdot 2H_2O$
Formula Weight: 219.51 g/mol
Quality Release Date: 06 JAN 2022



W2926
Open 7/5/22
received
on 7/5/22

| Test | Specification | Result |
|----------------------------|-------------------------------|--------------------|
| Appearance (Color) | White | White |
| Appearance (Form) | Powder or Crystal or Chunk(s) | Powder |
| Infrared Spectrum | Conforms to Structure | Conforms |
| Insoluble Matter | $\leq 0.005\%$ | 0.003 % |
| Calcium (Ca) | $\leq 0.005\%$ | 0.003 % |
| Chloride (Cl) | ≤ 5 ppm | < 5 ppm |
| Iron (Fe) | ≤ 5 ppm | < 5 ppm |
| Potassium (K) | $\leq 0.01\%$ | 0.00 % |
| Magnesium (Mg) | $\leq 0.005\%$ | 0.003 % |
| Sodium (Na) | $\leq 0.05\%$ | 0.03 % |
| Lead (Pb) | $\leq 0.002\%$ | $< 0.001\%$ |
| pH | 6.0 - 7.0 | 6.1 |
| Sulfate (SO ₄) | $\leq 0.005\%$ | $< 0.005\%$ |
| Complexometric EDTA | 98.0 - 101.0 % | 100.3 % |
| Meets ACS Requirements | Meets Requirements | Meets Requirements |


Larry Coers, Director
Quality Control
Milwaukee, WI US

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.





Certificate of Analysis

Buffer, Reference Standard, pH 7.00 ± 0.01 at 25°C (Color Coded Yellow)

Lot Number: 4401F99

Product Number: 1551

Manufacture Date: JAN 08, 2024

Expiration Date: DEC 2025

The certified value for this product is confirmed in independent testing by a second qualified chemist.

The NIST traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

| | | | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|------|------|
| °C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| pH | 7.12 | 7.09 | 7.06 | 7.04 | 7.02 | 7.00 | 6.99 | 6.98 | 6.98 | 6.97 | 6.97 |

| Name | CAS# | Grade |
|--------------------------------|-------------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Sodium Phosphate Dibasic | 7558-79-4 | ACS |
| Potassium Dihydrogen Phosphate | 7778-77-0 | ACS |
| Preservative | Proprietary | |
| Yellow Dye | Proprietary | |
| Sodium Hydroxide | 1310-73-2 | |

| Test | Specification | Result |
|------------|---------------|--------|
| Appearance | Yellow liquid | Passed |

*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 7.004 | 0.02 | 186-I-g, 186-II-g, 191d |

| Specification | Reference |
|-----------------------------|-----------------|
| Commercial Buffer Solutions | ASTM (D 1293 B) |
| Buffer A | ASTM (D 5464) |
| Buffer A | ASTM (D 5128) |

pH measurements were performed in our Batesville, IN laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.02) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1551-1 | 4 L natural poly | 24 months |
| 1551-1CT | 4 L Cubitainer® | 24 months |
| 1551-2.5 | 10 L Cubitainer® | 24 months |
| 1551-5 | 20 L Cubitainer® | 24 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Paul Brandon (01/08/2024)

Production Manager

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Contents of Certificates and Labels."

This product was tested in an ISO 17025 Accredited Laboratory

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Certificate of Analysis

Buffer, Reference Standard, pH 10.00 ± 0.01 at 25°C (Color Coded Blue)

Lot Number: 4310G83

Product Number: 1601

Manufacture Date: OCT 09, 2023

Expiration Date: MAR 2025

The certified value for this product is confirmed in independent testing by a second qualified chemist.

The NIST traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

| | | | | | | | | | | |
|----|-------|-------|-------|-------|-------|-------|------|------|------|------|
| °C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 50 |
| pH | 10.31 | 10.23 | 10.17 | 10.11 | 10.05 | 10.00 | 9.95 | 9.91 | 9.87 | 9.81 |

| Name | CAS# | Grade |
|--------------------|-------------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Sodium Carbonate | 497-19-8 | ACS |
| Sodium Bicarbonate | 144-55-8 | ACS |
| Sodium Hydroxide | 1310-73-2 | Reagent |
| Preservative | Proprietary | |
| Blue Dye | Proprietary | |

| Test | Specification | Result |
|------------|---------------|--------|
| Appearance | Blue liquid | Passed |

*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 10.003 | 0.02 | 186-I-g, 186-II-g, 191d |

| Specification | Reference |
|-----------------------------|-----------------|
| Commercial Buffer Solutions | ASTM (D 1293 B) |
| Buffer C | ASTM (D 5464) |
| Buffer C | ASTM (D 5128) |

pH measurements were performed in our Batesville, IN laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.02) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1601-16 | 500 mL natural poly | 18 months |
| 1601-5 | 20 L Cubitainer® | 18 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Paul Brandon (10/09/2023)

Production Manager

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Contents of Certificates and Labels."

This product was tested in an ISO 17025 Accredited Laboratory

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Certificate of Analysis

Sodium Thiosulfate, 0.0250 Normal (N/40)

Lot Number: 4403S13

Product Number: 7900

Manufacture Date: MAR 29, 2024

Expiration Date: SEP 2025

This product is specially formulated to increase its stability. A preservative is added to prevent bacterial contamination. However, all Sodium Thiosulfate solutions are subject to slow chemical deterioration and should be restandardized periodically.

| Name | CAS# | Grade |
|---------------------------------|-------------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Sodium Thiosulfate Pentahydrate | 10102-17-7 | ACS |
| Organic Preservative | Proprietary | |
| Sodium Carbonate | 497-19-8 | ACS |

| Test | Specification | Result | NIST SRM# |
|-------------------------------------|---------------------------|-------------------|-----------|
| Appearance | Colorless liquid | Passed | |
| Assay (vs. Potassium Iodate/Starch) | 0.02499-0.02501 N at 20°C | 0.02501 N at 20°C | 136 |

| Specification | Reference |
|--|---------------------|
| Standard Sodium Thiosulfate Solution, 0.0250 N | APHA (4500-S2- F) |
| Standard Sodium Thiosulfate Titrant | APHA (4500-O D) |
| Standard Sodium Thiosulfate Titrant | APHA (4500-O E) |
| Standard Sodium Thiosulfate Titrant | APHA (4500-O F) |
| Standard Sodium Thiosulfate Titrant, 0.025 N | APHA (4500-CI B) |
| Standard Sodium Thiosulfate Titrant | APHA (4500-O C) |
| Standard Sodium Thiosulfate Titrant, 0.025 M | APHA (5530 C) |
| Standard Sodium Thiosulfate Solution (0.025 N) | EPA (SW-846) (9031) |
| Standard Sodium Thiosulfate solution (0.025 N) | EPA (SW-846) (9034) |

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 7900-1 | 4 L natural poly | 18 months |
| 7900-16 | 500 mL natural poly | 18 months |
| 7900-1CT | 4 L Cubitainer® | 18 months |
| 7900-32 | 1 L natural poly | 18 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Paul Brandon (03/29/2024)

Production Manager

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Certificate of Analysis

Buffer, Reference Standard, pH 4.00 ± 0.01 at 25°C (Color Coded Red)

Lot Number: 4403F90

Product Number: 1501

Manufacture Date: MAR 09, 2024

Expiration Date: FEB 2026

The certified value for this product is confirmed in independent testing by a second qualified chemist.

The NIST Traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

| | | | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|------|------|
| °C | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| pH | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.01 | 4.02 | 4.03 | 4.04 | 4.06 |

| Name | CAS# | Grade |
|--------------------------|-------------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Potassium Acid Phthalate | 877-24-7 | Buffer |
| Preservative | Proprietary | Commercial |
| Red Dye | Proprietary | Purified |

| Test | Specification | Result |
|------------|---------------|--------|
| Appearance | Red liquid | Passed |

*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 4.000 | 0.02 | 185i, 186-I-g, 186-II-g |

| Specification | Reference |
|-----------------------------|-----------------|
| Commercial Buffer Solutions | ASTM (D 1293 B) |
| Buffer B | ASTM (D 5464) |
| Buffer B | ASTM (D 5128) |

pH measurements were performed in our Batesville, IN laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.02) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1501-2.5 | 10 L Cubitainer® | 24 months |
| 1501-32 | 1 L natural poly | 24 months |
| 1501-5 | 20 L Cubitainer® | 24 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Paul Brandon (03/09/2024)

Production Manager

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Certificate of Analysis



Sodium Hydroxide (Pellets)

Material: 0583
Grade: ACS GRADE
Batch Number: 23B1556310

Chemical Formula: NaOH
Molecular Weight: 40
CAS #: 1310-73-2
Appearance:

Manufacture Date: 12/14/2022
Expiration Date: 12/31/2025

Storage: Room Temperature

Pellets

| TEST | SPECIFICATION | ANALYSIS | DISPOSITION |
|--------------------|---------------|----------|-------------|
| Calcium | <= 0.005 % | <0.005 % | PASS |
| Chloride | <= 0.005 % | 0.002 % | PASS |
| Heavy Metals | <= 0.002 % | <0.002 % | PASS |
| Iron | <= 0.001 % | <0.001 % | PASS |
| Magnesium | <= 0.002 % | <0.002 % | PASS |
| Mercury | <= 0.1 ppm | <0.1 ppm | PASS |
| Nickel | <= 0.001 % | <0.001 % | PASS |
| Nitrogen Compounds | <= 0.001 % | <0.001 % | PASS |
| Phosphate | <= 0.001 % | <0.001 % | PASS |
| Potassium | <= 0.02 % | <0.02 % | PASS |
| Purity | >= 97.0 % | 99.2 % | PASS |
| Sodium Carbonate | <= 1.0 % | 0.5 % | PASS |
| Sulfate | <= 0.003 % | <0.003 % | PASS |

Internal ID #: 710

Signature

We certify that this batch conforms to the specifications listed.

This document has been electronically produced and is valid without a signature.

Leona Edwardson, Quality Control Sr. Manager - Solon
VWR Chemicals, LLC.
28600 Fountain Parkway, Solon OH 44139 USA

Additional Information

Analysis may have been rounded to significant digits in specification limits.

Product meets analytical specifications of the grades listed.



Sodium Hydroxide (Pellets)

Material: 0583
Grade: ACS GRADE
Batch Number: 23B1556310

Chemical Formula: NaOH
Molecular Weight: 40
CAS #: 1310-73-2
Appearance:

Manufacture Date: 12/14/2022
Expiration Date: 12/31/2025

Storage: Room Temperature

Pellets

Spec Set: 0583ACS

Internal ID #: 710

Signature

We certify that this batch conforms to the specifications listed.

This document has been electronically produced and is valid without a signature.

Leona Edwardson, Quality Control Sr. Manager - Solon
VWR Chemicals, LLC.
28600 Fountain Parkway, Solon OH 44139 USA

Additional Information

Analysis may have been rounded to significant digits in specification limits.

Product meets analytical specifications of the grades listed.

Certificate of Analysis

Iodine (Iodine-Iodide), 0.0250 Normal (N/40), 1 mL = 0.4008 mg S²⁻**Lot Number:** 2405D89**Product Number:** 3975**Manufacture Date:** MAY 10, 2024**Expiration Date:** MAY 2025

| Name | CAS# | Grade |
|------------------|-----------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Potassium Iodide | 7681-11-0 | ACS |
| Iodine | 7553-56-2 | ACS |

| Test | Specification | Result | NIST SRM# |
|---------------------------------------|---------------------------|-------------------|-----------|
| Appearance | Dark brown liquid | Passed | |
| Assay (vs. Sodium Thiosulfate/Starch) | 0.02498-0.02502 N at 20°C | 0.02502 N at 20°C | 136 |

| Specification | Reference |
|---|---------------------|
| Standard Iodine Solution, 0.0250 N | APHA (4500-S2- F) |
| Iodine Solution (approximately 0.025 N) | EPA (SW-846) (9031) |
| Standard Iodine Solution, 0.0250 N | EPA (376.1) |
| Iodine Solution (approximately 0.025 N) | EPA (SW-846) (9034) |

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 3975-1 | 4 L amber glass | 12 months |
| 3975-16 | 500 mL amber glass | 12 months |
| 3975-32 | 1 L amber glass | 12 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)

Jose Pena (05/10/2024)
Operations Manager

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Part of TCP Analytical Group

Jackson's Pointe Commerce Park- Building 1000
1010 Jackson's Pointe Court, Zelienople, PA 16063

Certificate of Analysis

Cyanide Standard 1000 ppm (1ml = 1mg CN)

Product Code: **LC13545**

Manufacture Date: August 01, 2024

Lot Number: **44080060**

Expiration Date: January 30, 2025

| Test | Specification | Result |
|-----------------------|--------------------|----------------|
| Appearance (clarity) | clear solution | clear solution |
| Appearance (color) | colorless | colorless |
| Concentration (CN) | 0.990 - 1.010mg/mL | 1.008mg/mL |
| Concentration (CN) | 990 - 1,010ppm | 1,008ppm |
| Traceable to NIST SRM | Report | 999b |

Intended Use - Product is intended for use in manufacturing procedures and laboratory procedures and protocols.

Storage Information - Unless noted on the product label, store the product under normal lab conditions in its tightly closed, original container. Do not pipet directly from the container or return unused portions to the container.

Instructions for Handling and Use - Please refer to the associated product label and Safety Data Sheet (SDS) for information regarding safety and handling of this product.

Preparation - All products are manufactured and tested according to established, documented procedures and methodology. Production documentation records manufacturing data, raw material traceability and testing history on a per lot basis. Balances, thermometers, and glassware are calibrated before first use and on a regular schedule with references traceable to NIST standards.

The suffix of the product code may differ from what is on your product label. The suffix will designate the size and be associated with a numeric digit(s). Visit LabChem.com for more information

| Suffix | 1 | 2 | 3/3S/36/36S | 4/4C | 5 | 6 | 7 | 8 | 9 | 20 | 44 | 200 | 246 | 486 |
|--------|------------|-----------|---------------------------------------|------|-----|-----|-------|-----|------|---------|------|------|--------|--------|
| Size | 500mL or g | 1L or 1kg | 2.5L/2.5L Coated/6x2.5L/6x2.5L Coated | 4L | 20L | 10L | 125mL | 25g | 100g | 20x20mL | 4x4L | 200L | 24x6mL | 48x6mL |

Michael Monteleone

Michael Monteleone
Chemistry Supervisor - Quality Control

ISO9001:2015 Registration #0306-01

2024080113:32:16bsturges-0-0

W3139 Received on 9/9/24 by IZ

Product No.: A12044
Product: Chloramine-T trihydrate, 98%
Lot No.: 10239484

| | |
|-------------------------------|--------------|
| Appearance: | White powder |
| Melting Point: | 166°C(dec) |
| Assay (Iodometric titration): | 100.5% |
| Identification (FTIR): | Conforms |

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This document has been electronically generated and does not require a signature.

Products are processed under ISO 9001:2015 quality management systems and samples are tested for conformance to the noted specifications. Certain data may have been supplied by third parties. We disclaim the implied warranties of merchantability and fitness for a particular purpose, and the accuracy of third party data or information associated with the product. Products are for research and development use only. Products are not for direct administration to humans or animals. It is the responsibility of the final formulator or end user to determine suitability, and to qualify and/or validate each product for its intended use.



Certificate of Analysis

Starch Indicator, 0.5% (w/v), Mercury Free, for Iodometric Titrations

Lot Number: 4408P62

Product Number: 8000

Manufacture Date: AUG 28, 2024

Expiration Date: AUG 2026

This product is Mercury-free.

| Name | CAS# | Grade |
|-----------------|-----------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Starch, soluble | 9005-84-9 | ACS |
| Salicylic Acid | 69-72-7 | ACS |

| Test | Specification | Result |
|---------------------|---|--------|
| Appearance | White translucent liquid | Passed |
| Suitability for Use | Colorless (Iodine absent) - Blue (Iodine present) | Passed |

| Specification | Reference |
|---------------------------|---------------------|
| Starch Solution | APHA (4500-S2- F) |
| Starch Indicator Solution | APHA (4500-CI B) |
| Starch Indicator | APHA (4500-SO32- B) |
| Starch indicator solution | APHA (2350 B) |
| Starch indicator solution | APHA (2350 E) |
| Starch Solution | APHA (510 B) |
| Starch Solution | APHA (5530 C) |
| Starch Indicator | APHA (4500-CI C) |
| Starch Indicator | EPA (345.1) |

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 8000-1 | 4 L natural poly | 24 months |
| 8000-16 | 500 mL natural poly | 24 months |
| 8000-32 | 1 L natural poly | 24 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)

A handwritten signature in blue ink that reads "Paul Brandon". The signature is fluid and cursive, with the first name "Paul" and last name "Brandon" clearly distinguishable.

Paul Brandon (08/28/2024)
Production Manager

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Certificate of Analysis

Cyanide Standard, 1000 ppm CN⁻

Lot Number: 1411J58**Product Number:** 2543**Manufacture Date:** NOV 22, 2024**Expiration Date:** MAY 2025

This standard is prepared using accurate volumetric techniques from material that has been assayed against Silver Nitrate solution certified traceable to NIST Standard Reference Material 999. The certified value reported is the prepared value based upon the method of preparation of the material. The uncertainty in the prepared value is the combined uncertainty based on the stability of the assayed Potassium Cyanide, and the uncertainty in the mass and volume measurements.

Use 0.16% (w/v) (0.04 N) Sodium Hydroxide or 0.225 % (w/v) (0.04 N) Potassium Hydroxide to make dilutions of this standard. Restandardize weekly if extreme accuracy is required.

| Name | CAS# | Grade |
|-------------------|-----------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Potassium Cyanide | 151-50-8 | ACS |
| Sodium Hydroxide | 1310-73-2 | Reagent |

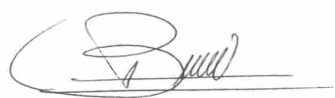
| Test | Specification | Result |
|----------------------------|------------------|----------|
| Appearance | Colorless liquid | Passed |
| Cyanide (CN ⁻) | 995-1005 ppm | 1000 ppm |

| Specification | Reference |
|--|------------------------|
| Stock Standard Cyanide Solution | APHA (4500-CN- F) |
| Stock Cyanide Solution | APHA (4500-CN- E) |
| Stock Cyanide Solution | APHA (4500-CN- K) |
| Stock Cyanide Solution | APHA (4500-CN- H) |
| Cyanide Reference Solution (1000 mg/L) | EPA (SW-846) (7.3.3.2) |
| Cyanide Calibration Stock Solution (1,000 mg/L CN ⁻) | EPA (SW-846) (9213) |
| Stock Cyanide Solution | EPA (335.3) |
| Stock Cyanide Solution | EPA (335.2) |
| Cyanide Solution Stock | ASTM (D 4282) |
| Simple Cyanide Solution, Stock (1.0 g/L CN ⁻) | ASTM (D 4374) |

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 2543-16 | 500 mL amber poly | 6 months |
| 2543-32 | 1 L amber poly | 6 months |
| 2543-4 | 120 mL amber poly | 6 months |

Recommended Storage: 2°C - 8°C (36°F - 46°F)

A handwritten signature in black ink, appearing to read 'L. Briceno', is written over a horizontal line.

Luis Briceno (11/22/2024)
Operations Supervisor

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Certificate of Analysis

Buffer, Reference Standard, pH 2.00 ± 0.01 at 25°C**Lot Number:** 2411E26**Product Number:** 1493**Manufacture Date:** NOV 11, 2024**Expiration Date:** OCT 2026

The certified value for this product is confirmed in independent testing by a second qualified chemist.

The NIST traceable pH value is certified to ±0.01 at 25 °C only. All other pH values at their corresponding temperatures are accurate to ± 0.05.

| | | | | | | | | | |
|----|------|------|------|------|------|------|------|------|------|
| °C | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
| pH | 1.93 | 1.98 | 1.98 | 2.00 | 2.01 | 2.03 | 2.03 | 2.04 | 2.04 |

| Name | CAS# | Grade |
|--------------------|-----------|-----------------|
| Water | 7732-18-5 | ACS/ASTM/USP/EP |
| Potassium Chloride | 7447-40-7 | ACS |
| Hydrochloric Acid | 7647-01-0 | ACS |

| Test | Specification | Result |
|------------|------------------|--------|
| Appearance | Colorless liquid | Passed |

*Not a certified value.

| Test | Certified Value | Uncertainty | NIST SRM# |
|---------------------------------------|-----------------|-------------|-------------------------|
| pH at 25°C (Method: SQCP027, SQCP033) | 1.994 | 0.02 | 185i, 186-I-g, 186-II-g |

pH measurements were performed in our Pocomoke City, MD laboratory under ISO/IEC 17025 accreditation (ANAB Certificate L2387.01) and are certified traceable to National Institute of Standards and Technology (NIST) Standard Reference Material as indicated above via an unbroken chain of comparisons. The uncertainty is calculated from the uncertainty of the measurement variation from sample to sample, the uncertainty in the NIST Standard Reference Material, and the uncertainty of the measurement process. The uncertainty is multiplied by k=2, corresponding to 95% coverage in a normal distribution. Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| 1493-1 | 4 L natural poly | 24 months |
| 1493-16 | 500 mL natural poly | 24 months |
| 1493-1CT | 4 L Cubitainer® | 24 months |
| 1493-2.5 | 10 L Cubitainer® | 24 months |
| 1493-32 | 1 L natural poly | 24 months |

Recommended Storage: 15°C - 30°C (59°F - 86°F)



Jose Pena (11/11/2024)
Operations Manager

This product was tested in an ISO 17025 Accredited Laboratory

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