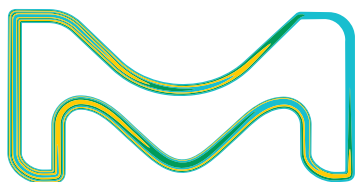


# Physical & Chemical Property Standards for Analytical Characterization

High-Quality Certified Reference  
Materials (CRMs) for Accurate  
Calibration of Your Equipment



# PHYSICAL AND CHEMICAL PROPERTY STANDARDS

Your quest for consistent and reliable analytical test data in your results has a perfect match in our portfolio of physical and chemical property standards. Whether you are ascertaining the identity or purity of the analyte or verifying the accuracy of your calibration equipment, you will need to employ high-quality standards for reproducible and accurate measurements.

Discover a wide array of high-quality standards and certified reference materials (CRMs) for the precise calibration of your instruments. Our standards cover a broad range of determinations, including pH buffer standards, volumetric standards, color standards, Karl Fischer (KF) standards, Total Acid Number (TAN), Total Base Number (TBN), melting point standards, and UV/VIS standards, among others. Choose our CRMs for your next calibration and experience the difference quality makes.

**Never compromise on the quality of your analyses.**

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# The Need for Physical and Chemical Property Standards is Everywhere

Physical and Chemical property standards, as the name suggests, are used to calibrate instruments used in the analyses of various physical and chemical properties such as melting point instruments, density meters, turbidimeters, spectrophotometers, color measuring instruments and colorimeters.

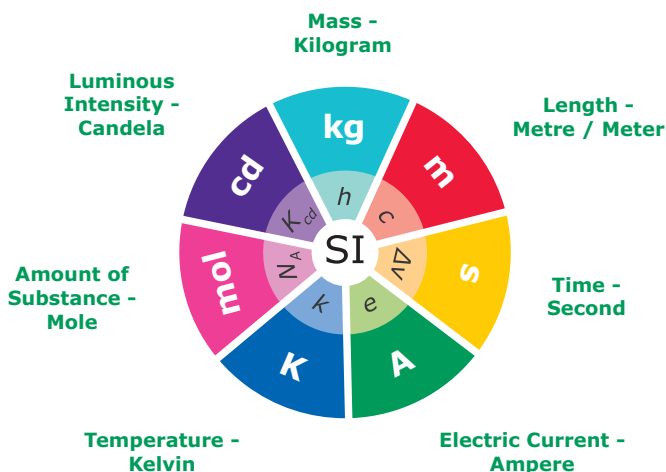
Almost all laboratories in chemical research involve in the measurement of physical and chemical properties. And the measurement of these properties is key to the determination of identity and purity of substances and materials. For example, color determination is very important in statistical quality control (SQC) and statistical process control (SPC). Karl Fischer titration is the gold standard for water determination in Pharma, Food & Beverage, Cosmetics, Petrochemicals and Polymer industries. Various types of titrations are employed for estimations of assay, impurity, acidity/alkalinity, fatty acid content in oils as well as water hardness. UV-Vis spectroscopic measurements are used in environmental water testing, food testing & pharmaceutical research. When a new compound is synthesized, its melting point determination is one of the key parameters to ascertain the chemical structure.

We offer a vast portfolio of Physical & Chemical Property Standards with applications in almost every industry segment ranging from Pharma, Industrial testing, Environmental, Food & Beverage and Material Sciences.

Find more information on Quality Grades, check out: [How to Choose the Correct Reference Material Quality Grade](#)

Explore the [flyer](#) detailing key features of our physical and chemical property standards, their quality grades, and their positioning in different industries.

This brochure mainly focuses on physical and chemical property standards. However, we also offer accessories to support your daily calibration requirements. Explore our up-to-date portfolio by visiting [SigmaAldrich.com/physicalproperties](https://www.sigmaaldrich.com/physicalproperties)



**Figure 1.** Metrological Traceability – SI Unit of Measurement

# Our Certified Reference Material-grade Physical & Chemical Property Standards are analyzed in our ISO / IEC 17205 accredited laboratories

Achieve consistently reliable results in your laboratory using our CRM standards analyzed by our ISO/IEC 17025 laboratory according to ISO 17034 specifications. Laboratories that either work in regulated environments, or are ISO/IEC 17025 accredited, are better prepared for audits. ISO/IEC 17025 is a recognized international accreditation for laboratories and is accepted worldwide through the International Laboratory Accreditation Organization (ILAC), and every country has its own accreditation bodies that are members of the ILAC.



## Accreditation



The Deutsche Akkreditierungsstelle attests with this **Accreditation Certificate** that the calibration laboratory

**Merck KGaA**  
**Kalibrierlaboratorium für chemische Messgrößen**  
**Frankfurter Straße 250, 64293 Darmstadt**

meets the minimum requirements according to DIN EN ISO/IEC 17025:2018 for the conformity assessment listed in the annex to this certificate. This includes additional existing legal and normative requirements, including those in relevant sectoral schemes.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

This accreditation was issued in accordance with Art. 5 Para. 1 Sentence 2 of Regulation (EC) 765/2008, after an accreditation procedure was carried out in compliance with the minimum requirements of DIN EN ISO/IEC 17011 and on the basis of a review and decision of the appointed accreditation committees.

This accreditation certificate only applies in connection with the notices of 07.02.2023 with accreditation number D-K-15185-01. It consists of this cover sheet, the reverse side of the cover sheet and the following annex with a total of 4 pages.

Registration number of the accreditation certificate: **D-K-15185-01-00**

Berlin, 07.02.2023

Translation issued:  
14.02.2023

Dipl.-Wirtsch.-Ing. (BA) Tim Harnisch  
Head of Technical Unit

*The certificate together with the annex reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH ([www.dakks.de](http://www.dakks.de)).*

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf

# 1. pH Buffer Standards

Buffer solutions are essential for maintaining proper calibration of pH instruments. The accuracy of pH measurements is directly affected by the buffer reference materials used during calibration.

## Features & Benefits

- **Secure:** Certified under ISO 17034 and ISO/IEC 17025 accreditations to ensure consistently reliable results
- **Trusted:** Traceable to SI units via NIST (National Institute of Standards and Technology, USA) and PTB (Physical Technical Institute, National Metrological Institute of Germany)
- **Ready for Audits:** Detailed CoA for every product
- **Always Fresh:** Available as ready-to-use, single-use sachets
- Offered with certified pH values at both 20 °C and 25 °C
- Available in innovative & eco-friendly packaging Titripac® format with ensured stability



Certipur® buffer solutions in small & handy single-use sachets: Preparation effort reduced to a minimum - Just open the sachet and start calibrating.

Innovative Titripac® Format- Reducing environmental impact through sustainable design





**Table 1. Buffer Standards**

| Product Number | Product Name   |
|----------------|--|
| 1.01962        | Sodium hydrogen carbonate/sodium carbonate, certified reference material, traceable to NIST SRM, traceable to PTB  |
| 1.01963        | Potassium hydrogen tartrate, certified secondary standard reference material for pH measurement; directly traceable to primary SRM from NIST/PTB pH(S) = 3.63 <sub>9</sub> / pH(S) = 3.55 <sub>7</sub> (25 °C) Certipur® |
| 1.01964        | di-Sodium tetraborate decahydrate, certified secondary standard reference material for pH measurement; directly traceable to primary SRM from NIST/PTB pH(S)=9.18 <sub>0</sub> (25 °C) Certipur®                         |
| 1.01965        | Potassium hydrogen phthalate, certified secondary standard reference material for pH measurement; directly traceable to primary SRM from NIST/PTB pH(S) = 4.00 <sub>5</sub> (25 °C) Certipur®                            |
| 1.01961        | Potassium tetraoxalate dihydrate, certified secondary standard reference material for pH measurement; directly traceable to primary reference material from NIST/PTB pH (S) = 1.67 <sub>9</sub> (25 °C) Certipur®        |
| 1.01960        | Potassium dihydrogen phosphate/ di-sodium hydrogen phosphate, certified reference material, traceable to NIST (SRM), traceable to PTB  |
| 1.09888        | Buffer concentrate (borate/hydrochloric acid), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 8.00 ± 0.02 (20 °C) Titrisol®   |
| 1.09885        | Buffer concentrate (citrate/sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 5.00 ± 0.02 (20 °C) Titrisol®   |
| 1.09893        | Buffer concentrate (potassium chloride/sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 13.00 ± 0.05 (20 °C) Titrisol®   |
| 1.09892        | Buffer concentrate (phosphate/sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 12.00 ± 0.05 (20 °C) Titrisol®  |
| 1.09879        | Buffer concentrate for buffer solution acc. to WEISE, for 1000 mL of solution (phosphate), pH 7.20 Titrisol®   |
| 1.09880        | Buffer concentrate (boric acid/potassium chloride/ sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 11.00 ± 0.05 (20 °C) Titrisol®   |
| 1.09881        | Buffer concentrate (glycine/hydrochloric acid), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 1.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09882        | Buffer concentrate (citrate/hydrochloric acid), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 2.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09883        | Buffer concentrate (citrate/hydrochloric acid), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 3.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09884        | Buffer concentrate (citrate/hydrochloric acid), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 4.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09886        | Buffer concentrate, (citrate/sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 6.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09887        | Buffer concentrate (phosphate), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 7.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09889        | Buffer concentrate (boric acid/potassium chloride/ sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 9.00 ± 0.02 (20 °C) Titrisol®  |
| 1.09890        | Buffer concentrate (boric acid/potassium chloride/ sodium hydroxide), traceable to SRM of NIST and PTB for 500 mL buffer solution, pH 10.00 ± 0.05 (20 °C) Titrisol®   |

| Product Number | Product Name  |
|----------------|---|
| 40-0101*       | pH standard solution, pH 1.68 25 °C   |
| 40-0102*       | pH standard solution, pH 4.01 25 °C   |
| 40-0103*       | pH standard solution, pH 6.86 25 °C   |
| 40-0104*       | pH standard solution, pH 9.18 25 °C   |
| 40-0105*       | pH standard solution, pH 10.01 25 °C  |
| 40-0115*       | pH standard solution, pH 4.01 25 °C, JCSS   |
| 40-0116*       | pH standard solution, pH 6.86 25 °C, JCSS   |
| 40-0117*       | pH standard solution, pH 9.18 25 °C, JCSS   |
| BX1627**       | Buffer Concentrate, pH 7.0  |
| BX1632**       | Buffer pH 7.0 Yellow  |
| BX1633**       | Buffer pH 10.0 Blue   |
| BX1634**       | Buffer pH 4.0 Clear   |
| BX1635**       | Buffer pH 7.0 Clear   |
| BX1636**       | Buffer pH 10.0 Clear  |
| BX1641**       | Buffer pH 10.0 Blue   |
| BX1642**       | Buffer pH 10.0 Clear  |
| BX1651**       | Buffer pH 1.0 Clear   |
| BX1652**       | Buffer pH 2.0 Clear   |
| BX1657**       | Buffer pH 8.0 Clear   |
| BX1658**       | Buffer pH 9.0 Clear   |
| BX1628**       | Buffer pH 4.0 Red   |
| BX1656**       | Buffer pH 6.0 Clear   |
| EM0180         | Buffer pH 12.45   |
| BX1653**       | Buffer pH 3.0 Clear   |
| BX1626**       | Buffer Variety Pack, Kit  |
| BX1655**       | Buffer pH 5.0 Clear   |
| EM0182         | Buffer pH 1.68  |
| EM0186         | Buffer pH 6.86  |
| B5020          | Buffer, reference standard, pH 4.00 +/- 0.01 25 °C  |
| B4895          | Buffer, reference standard, pH 10.00 +/- 0.01 25 °C   |
| 1.01645        | Buffer solution, (di-sodium tetraborate), traceable to SRM from NIST and PTB pH 9.22 (20 °C), Certipur®   |
| 1.02111        | Calcium hydroxide, for the preparation of DIN 19266 pH standard buffer solutions  |
| 1.04875        | Potassium dihydrogen phosphate solution, (buffer stock solution) 1/15 mol/L   |
| 1.06587        | di-Sodium hydrogen phosphate solution, (buffer stock solution) 1/15 mol/L   |
| 1.07200        | Certified sec. standard reference buffer solution   |
| 1.07202        | Certified sec. standard reference buffer solution, potassium dihydrogen phosphate/di-sodium hydrogen phosphate, traceable to PTB SRM, traceable to PTB SRM, pH 6.86 25 °C, Certipur®, traceable to NIST SRM |
| 1.07203        | Certified sec. standard reference buffer solution, di-sodium tetraborate decahydrate, directly traceable to primary SRM from NIST/PTB pH(S) = 9.18 <sub>0</sub> (25 °C), Certipur®                          |
| 1.07204        | Certified sec. standard reference buffer solution, potassium tetraoxalate dihydrate, directly traceable to primary SRM from NIST/PTB pH(S) = 1.67 <sub>9</sub> (25 °C), Certipur®                           |
| 1.07205        | Certified sec. standard reference buffer solution, potassium dihydrogen phosphate/di-sodium hydrogen phosphate, traceable to NIST SRM, traceable to PTB SRM, pH 7.41 25 °C, Certipur®                       |

| Product Number | Product Name   |
|----------------|--|
| 1.07294        | Buffer solution, di-sodium hydrogen phosphate/potassium dihydrogen phosphate, traceable to NIST, traceable to PTB, pH 6.88 20 °C, Certipur®    |
| 1.07827        | Buffer solution, (acetic acid/sodium acetate), traceable to SRM from NIST and PTB pH 4.66 (20 °C), Certipur®                                   |
| 1.09400        | Buffer Solution, (boric acid/potassium chloride/sodium hydroxide), colour coded: yellow, traceable to NIST and PTB pH 10.00 (20 °C), Certipur® |
| 1.09406        | Buffer solution (potassium hydrogen phthalate), traceable to SRM from NIST and PTB, pH 4.01 (25 °C), Certipur®                                 |
| 1.09407        | Buffer solution (potassium dihydrogen phosphate/disodium hydrogen phosphate), traceable to SRM from NIST and PTB, pH 7.00 (25 °C) Certipur®    |
| 1.09408        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 9.00 (25 °C), Certipur®               |
| 1.09409        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 10.00 (25 °C), Certipur®              |
| 1.09432        | Buffer solution (glycine/sodium chloride/hydrogen chloride), traceable to SRM from NIST and PTB, pH 1.00 (20 °C), Certipur®                    |
| 1.09433        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 2.00 (20 °C), Certipur®               |
| 1.09434        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 3.00 (20 °C), Certipur®               |
| 1.09435        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 4.00 (20 °C), Certipur®               |
| 1.09436        | Buffer solution (citric acid/sodium hydroxide), traceable to SRM from NIST and PTB, pH 5.00 (20 °C), Certipur®                                 |
| 1.09437        | Buffer solution (citric acid/sodium hydroxide), traceable to SRM from NIST and PTB, pH 6.00 (20 °C), Certipur®                                 |
| 1.09438        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 10.00 (20 °C), Certipur®              |
| 1.09439        | Buffer solution (di-sodium hydrogen phosphate/potassium dihydrogen phosphate), traceable to SRM from NIST and PTB, pH 7.00 (20 °C), Certipur®  |
| 1.09441        | Buffer solution (glycine/sodium chloride/hydrogen chloride), traceable to SRM from NIST and PTB, pH 1.00 (25 °C), Certipur®                    |
| 1.09442        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 2.00 (25 °C) Certipur®                |
| 1.09444        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 3.00 (25 °C), Certipur®               |

| Product Number | Product Name   |
|----------------|--|
| 1.09445        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 4.00 (25 °C), Certipur®                             |
| 1.09446        | Buffer solution (citric acid/sodium hydroxide), traceable to SRM from NIST and PTB, pH 5.00 (25 °C), Certipur®   |
| 1.09460        | Buffer solution (boric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 8.00 (20 °C), Certipur®                              |
| 1.09461        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 9.00 (20 °C), Certipur®                             |
| 1.09462        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 11.00 (20 °C), Certipur®                            |
| 1.09475        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), colour: red, traceable to SRM from NIST and PTB, pH 4.00 (20 °C), Certipur®                |
| 1.09476        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), coloured: blue, traceable to SRM from NIST and PTB, pH 9.00 (20 °C), Certipur®             |
| 1.09477        | Buffer solution (di-sodium hydrogen phosphate/potassium dihydrogen phosphate), colour: green, traceable to SRM from NIST and PTB, pH 7.00 (20 °C), Certipur® |
| 1.99001        | Buffer solution (potassium hydrogen phthalate), traceable to SRM from NIST and PTB, pH 4.01 (25 °C), Certipur®   |
| 1.99002        | Buffer solution (potassium dihydrogen phosphate/disodium hydrogen phosphate), traceable to SRM from NIST and PTB pH, 7.00 (25 °C), Certipur®                 |
| 1.99003        | Buffer solution (boric acid/potassium chloride/sodium hydroxide solution), traceable to SRM from NIST and PTB, pH 9.00 (25 °C), Certipur®                    |
| 1.99004        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 10.00 (25 °C), Certipur®                            |
| 1.99005        | Buffer solutions, traceable to NIST, traceable to PTB, pH 4.01 (25 °C), phthalate, pH 7.00, 25 °C, phosphate, pH 9.00, borate, Certipur®                     |
| 1.99006        | Buffer solutions, traceable to NIST, traceable to PTB, pH 4.01 (25 °C), phthalate, pH 7.00 (25 °C), phosphate, pH 9.00, borate, Certipur®                    |
| 1.99011        | Buffer solution (Potassium tetraoxalate), traceable to SRM from NIST and PTB, pH 1.68 (25 °C), Certipur®   |
| 1.99012        | Buffer Solution (citric acid, sodium hydroxide, hydrogen chloride), traceable to SRM from NIST and PTB, pH 2.00 (25 °C), Certipur®                           |
| 1.99015        | Buffer solution (Potassium tetraoxalate), traceable to SRM from NIST and PTB, pH 1.68 (25 °C), Certipur®   |
| 1.99016        | Buffer Solution (citric acid/sodium hydroxide), traceable to SRM from NIST and PTB, pH 6.00 (25 °C), Certipur®   |



| Product Number | Product Name  |
|----------------|---|
| 1.99019        | Buffer solution (di-sodium tetraborate), traceable to SRM from NIST and PTB, pH 9.18 (25 °C), Certipur®                             |
| 1.99021        | Buffer Solution (boric acid, sodium hydroxide, potassium chloride), traceable to SRM from NIST and PTB, pH 11.00 (25 °C), Certipur® |
| 1.99022        | Buffer Solution (di-sodium hydrogen phosphate/sodium hydroxide), traceable to SRM from NIST und PTB, pH 12.00 (25 °C), Certipur®    |
| 1.99036        | Buffer solution (citric acid/sodium hydroxide), traceable to SRM from NIST and PTB, pH 6.00 (25 °C), Certipur®                      |
| 1.99038        | Buffer solution (boric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 8.00 (25 °C), Certipur®     |
| 1.99041        | Buffer solutions (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB, pH 11.00 (25 °C), Certipur®  |

\*Sold in Japan only

\*\*Sold in US only

| Product Number | Product Name   |
|----------------|--|
| 1.99050        | Buffer solution (boric acid/potassium chloride/sodium hydroxide), colour coded: blue, traceable to NIST and PTB, pH 10.00 (25 °C), Certipur®                 |
| 1.99054        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), colour: red, traceable to SRM from NIST and PTB, pH 4.00 (25 °C)                           |
| 1.99057        | Buffer solution (di-sodium hydrogen phosphate/potassium dihydrogen phosphate), colour:yellow, traceable to SRM from NIST and PTB, pH 7.00 (25 °C), Certipur® |
| 1.99064        | Buffer solution (citric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB, pH 4.00 (25 °C), Certipur®                             |
| 1.99068        | Buffer solution (di-sodium hydrogen phosphate/potassium dihydrogen phosphate), traceable to NIST, traceable to PTB, pH 6.86 25 °C, Certipur®                 |
| 1.99091        | Buffer solution (di-sodium tetraborate), traceable to SRM from NIST and PTB, pH 9.18 (25 °C), Certipur®  |

- Explore our extensive list of buffer standards: [Buffer Standards](#)
- Explore [technical datasheet](#) for stability data of Titripac® packaging (also available on respective Product Description Pages)
- Find more information about these products in our newly launched brochure: [Buffer Calibration standards for pH Measurements](#)
- Find detailed information about sustainable packaging solution “ Titripac®”: [Analytix Reporter Journal Issue 13/2022](#)



## 2. Titration – Volumetric Reference Materials

Accurate titer determination is an important criterion for precise and comparable titration analysis. Our offering of Certipur® volumetric standards include high-purity secondary reference materials for acidimetry, alkalimetry, argentometry, complexometric, iodometry and redox titration.

### Features & Benefits

- Highly pure materials traceable to NIST
- In accordance with the reagents part of major Pharmacopoeias
- Measured in ISO 17025 accredited laboratory
- Branded as CRMs in accordance with ISO 17034



**Table 2. Volumetric Standards**

| Product Number | Product Name  | Applications    |
|----------------|---|-----------------|
| 1.02400        | Potassium hydrogen phthalate, Volumetric standard, secondary reference material for alkalimetry, traceable to NIST Standard Reference Material (SRM), Certipur® Reag. Ph. Eur., Reag. USP <sup>1,2</sup>  | Alkalimetry     |
| 1.02401        | Benzoic acid, volumetric standard, secondary reference material for alkalimetry, traceable to NIST, Standard Reference Material (SRM), Certipur® Reag. Ph. Eur., Reag. USP <sup>1,2</sup>                 |                 |
| 1.02405        | Sodium carbonate, volumetric standard, secondary reference material for acidimetry, traceable to NIST SRM, Certipur® <sup>1</sup>   | Acidimetry      |
| 1.02408        | Tris(hydroxymethyl)aminomethane, volumetric standard, secondary reference material for acidimetry, traceable to NIST, Standard Reference Material (SRM), Certipur® Reag. Ph. Eur., Reag. USP <sup>2</sup> |                 |
| 1.02406        | Sodium chloride, volumetric standard, secondary reference material for argentometry, traceable to NIST SRM, Certipur® Reag. Ph. Eur., Reag. USP <sup>1,2</sup>  | Argentometry    |
| 1.02407        | di-Sodium oxalate, volumetric standard, secondary reference material for redox titration, traceable to NIST, Standard Reference Material (SRM), Certipur® Reag. USP <sup>2</sup>                          | Redox Titration |
| 1.02402        | Iron (II) ethylenediammonium sulfate, Volumetric standard, secondary reference material for redox titration, traceable to NIST, Standard Reference Material (SRM), Certipur® Reag. Ph. Eur.1              |                 |
| 1.02403        | Potassium dichromate, volumetric standard, secondary reference material for redox titration, traceable to NIST, SRM Certipur® Reag. USP <sup>2</sup>  |                 |

| Product Number | Product Name   | Applications    |
|----------------|--|-----------------|
| 1.02410        | Calcium carbonate, volumetric standard, secondary reference material for complexometry, traceable to NIST, Standard Reference Material (SRM), Certipur® Reag. USP <sup>2</sup> | Complexometry   |
| 1.02409        | Zinc, volumetric standard, secondary reference material for complexometry, traceable to NIST, SRM Certipur® Reag. Ph. Eur. <sup>1</sup>  |                 |
| 1.02404        | Potassium iodate, volumetric standard, secondary reference material for iodometry, traceable to NIST SRM, Certipur®  | Iodometry       |
| 94119          | Glycine, analytical standard, for Nitrogen Determination according to Kjeldahl Method <sup>3</sup>   | Kjeldahl Method |
| TKN1000        | Kjeldahl Nitrogen, Total (TKN) 1000 mg/L Calibration Standard, certified reference material <sup>3</sup>   |                 |

<sup>1</sup> Solution according to Reag. Ph. Eur

<sup>2</sup> Solution according to the reagents chapter of USP

<sup>3</sup> BAM Certification

Explore our [Volumetric Reference Materials](#)

Our broad portfolio of volumetric reference materials is available in different concentrations and packaging.

Please find more information on our Titripur® Volumetric Solutions, Titripac® Packaging for Volumetric Solutions, Titrisol® Volumetric Concentrates, SmartChemicals for Digitalized Titration & 3S Reagents for Digitalized Volumetric Titration by clicking the link:

[SigmaAldrich.com/titration-reagents](https://SigmaAldrich.com/titration-reagents)

Find detailed information about these products in the [Volumetric Titration Brochure: Volumetric Solutions and Standards for Titration](#)

# 3. Karl Fischer Standards

Aquastar® Karl Fischer reagents and standards ensure rapid, precise, and consistent results for water determination in solid, liquid, and gas samples. Our Aquastar® product portfolio includes reagents for volumetric and coulometric methods. Aquastar® water standards are available as certified reference materials according to ISO 17034 for a precise titer determination, instrument check, and the verification of titration results.

### Features & Benefits

- Batch-specific Certificate of Analysis for QM documentation
- Reliable and correct results
- Manufactured and analyzed by an ISO/IEC 17025 accredited calibration lab
- Quality Grade: CRM according to ISO 17034
- Comprehensive datasheets available now on PDP's: Explaining Karl Fischer titration parameters and procedure under handling recommendations

**Table 3. Karl Fischer Standards**

| Product Number | Product Name  |
|----------------|---|
| 1.12939        | Lactose Standard 5%, solid water standard for coulometric/volumetric Karl Fischer Titration and Karl Fischer oven method, Aquastar® |
| 1.09259        | Water standard 5 mg/mL, (1 mL contains 5 mg H <sub>2</sub> O) Aquastar®   |
| 1.06664        | Sodium tartrate dihydrate, Water standard for volumetric Karl Fischer Titration (volumetric standard), Aquastar®                    |
| 1.88050        | Water Standard 0.01%, Standard for coulometric Karl Fischer Titration, 1 g ± 0.1 mg H <sub>2</sub> O, Aquastar®                     |
| 1.88052        | Water standard 1%, Standard for volumetric Karl Fischer Titration, 1 g ± 10 mg H <sub>2</sub> O, Aquastar®                          |
| 1.88055        | Water standard oil, standard for oil samples for coulometric Karl Fischer Titration (15-30 ppm), Aquastar®                          |
| 1.88054        | Water Standard Oven, 1%, solid standard for KF oven method, Aquastar®   |
| 1.88051        | Water standard 0.1%, Standard for coulometric Karl Fischer Titration, 1 g ± 1 mg H <sub>2</sub> O, Aquastar®                        |

Explore our extensive portfolio of Karl Fisher Titration products here:

- [Aquastar® Reagents for Volumetric & Coulometric Karl Fischer Titration](#)
- [Aquastar® Karl Fischer Standards](#)



Learn more on handling & usage of our standards: [Karl Fischer Titration Video](#)

Explore the comprehensive brochure on our Karl Fischer portfolio: [Accurate Water Determination, Aquastar® reagents and standards for precise Karl Fischer titration results](#)

# 4. Color Reference Standards

Color reference standards are ideal for routine validation of instruments used for color measurements/colorimeters. These standards also assure comparison of results between different laboratories or between different instruments and hence ensure the accuracy of test data. They are also widely used in statistical quality control (SQC) and statistical process control (SPC).



### Features & Benefits

- Certipur® reference solutions available in B, BY, Y, GY, and R colors as a single, ready-to-use kit
- Supplied with full traceability to internationally recognized standards, either UKAS to ISO 17025 / ISO 17034 (ASTM, Gardner & Saybolt Color) or the ISO 9001 quality system (AOCS-Tintometer, Lovibond RYBN and Pt-Co Color)
- Accompanied with a detailed certificate of analysis for an effective quality management system

**Table 4. Color standards**

| Product Number | ASTM Color Reference Standards  |
|----------------|---|
| ASTM05         | ASTM Colour Reference Standard, ASTM D 6045, D1500 (ASTM colour <0.5)                           |
| ASTM10         | ASTM Colour Reference Standard, ASTM D 6045, D1500 (ASTM colour 1)                              |
| ASTM30         | ASTM Colour Reference Standard, ASTM D 6045, D1500 (ASTM colour 3)                              |
| ASTM50         | ASTM Colour Reference Standard, ASTM D 6045, D1500 (ASTM colour 5)                              |
| ASTM70         | ASTM Colour Reference Standard, ASTM D 6045, D1500 (ASTM colour 7)                              |
| Product Number | AOCS-Tintometer Color Reference Standards   |
| 134240         | AOCS-Tintometer Colour Reference Standard, 0.3R 1.7Y (5¼")                                      |
| 134250         | AOCS-Tintometer Colour Reference Standard, 1.3R 8.8Y (5¼")                                      |
| 134260         | AOCS-Tintometer Colour Reference Standard, 1.7R 12Y   |
| 134270         | AOCS-Tintometer Colour Reference Standard, 3.0R 22Y (5 ¼")                                      |
| Product Number | Gardner Color Reference Standards   |
| GARD02         | Gardner Colour Reference Standard, ASTM D 1544, D 6166 (ASTM colour 2)                          |
| GARD05         | Gardner Colour Reference Standard, ASTM D 1544, D 6166 (ASTM colour 5)                          |
| GARD08         | Gardner Colour Reference Standard, ASTM D 1544, D 6166 (ASTM colour 8)                          |
| Product Number | Color Reference Solutions according to Ph. Eur., APHA and USP                                   |
| 1.00265        | Colour Reference Solutions B, according to Ph. Eur color intensity testing B1-B9, Certipur      |
| 1.00266        | Colour Reference Solutions BY, according to Ph. Eur color intensity testing BY1-BY7, Certipur   |
| 1.00267        | Colour Reference Solutions Y, according to Ph. Eur color intensity testing Y1-Y7, Certipur      |
| 1.00268        | Colour Reference Solutions GY, according to Ph. Eur. color intensity testing GY1-GY7, Certipur® |
| 1.00269        | Colour Reference Solutions R, according to Ph. Eur. color intensity testing R1-R7, Certipur®    |
| 72599          | Color Reference Solution acc. to APHA, set 20 2mL 20 standard solutions                         |
| 72666          | Color Reference Solutions acc. to Ph. Eur, Set of colors BY                                     |
| 83883          | Color Reference Solutions acc. to Ph. Eur, Set of colors Y                                      |
| 83951          | Color Reference Solutions acc. to Ph. Eur, Set of colors B                                      |
| 83952          | Color Reference Solutions acc. to Ph. Eur, Set of colors B, BY, Y, GY, R                        |
| 83967          | Color Reference Solutions acc. to Ph Eur, Set of colors Y                                       |
| 86293          | Color Reference Solutions acc. to Ph Eur, Set of colors BY                                      |
| 87448          | Color Reference Solutions acc. to Ph Eur, Set of colors R                                       |
| 87574          | Color Reference Solutions acc. to USP, set 20x10 mL 20 standard solutions                       |
| 87576          | Color Reference Solutions acc. to USP, set 20x2 mL 20 standard solution                         |
| 90232          | Color Reference Solutions acc. to Ph. Eur, Set of colors B, BY, Y, GY, R                        |
| 90269          | Color Reference Solutions acc. to Ph. Eur, Set of colors GY                                     |
| 92936          | Color Reference Solutions acc. to Ph. Eur, Set of colors B                                      |
| 95872          | Color Reference Solutions acc. to Ph Eur, Set of colors R                                       |
| 77147          | Color Reference Solution acc. to APHA, set 20x10 mL 20 standard solutions                       |
| 82995          | Color Reference Solutions acc. to Ph. Eur, Set of colors GY                                     |
| Product Number | Lovibond RYBN Colour Reference Standards  |
| 134110         | Lovibond RYBN Colour Reference Standard, 1.6R 11.0Y 0.1N (5 ¼")                                 |
| 134120         | Lovibond RYBN Colour Reference Standard, 2.0R 14.0Y 0.1N (5¼")                                  |
| 134130         | Lovibond RYBN Colour Reference Standard, 2.9R 22.0Y 0.5N (5 ¼")                                 |
| Product Number | Pt-Co/Hazen/APHA Colour Reference Standards   |
| PTCO000        | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM color 0)                          |
| PTCO005        | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 5)                         |
| PTCO010        | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 10)                        |
| PTCO015        | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 15)                        |

|  |   |
|--|---|
| <b>PTCO030</b>                           | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 30)                  |
| <b>PTCO050</b>                           | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 50)                  |
| <b>PTCO100</b>                           | Pt-Co/Hazen/APHA Colour Reference Standard, ASTM D 1209 (ASTM colour 100)                 |
| <b>PTCO500</b>                           | Pt-Co/Hazen/APHA Colour Reference Standard, stock solution, ASTM D 1209 (ASTM colour 500) |
| <b>1.00246</b>                           | Platinum Cobalt Color Standard Solution (HAZEN 500), Pt 500 mg/L Certipur®                |
| <b>Saybolt Colour Reference Standard</b> |   |
| <b>SAYB02</b>                            | Saybolt Colour Reference Standard, ASTM D 6045, D 156 (ASTM colour 25)                    |

|  |  |
|--|--|
| <b>SAYB06</b>                                    | Saybolt Colour Reference Standard, ASTM D 6045, D 156 (ASTM colour 12) |
| <b>SAYB07</b>                                    | Saybolt Colour Reference Standard, ASTM D 6045, D 156 (ASTM colour 0)  |
| <b>SAYB08</b>                                    | Saybolt Colour Reference Standard, ASTM D 6045, D 156 (ASTM colour 10) |
| <b>Additional Color Standards &amp; Ampoules</b> |  |
| <b>91711</b>                                     | Sigma-Aldrich Color Chart  |
| <b>CLR100</b>                                    | Color 100 Pt-Co Units Calibration Standard                             |
| <b>CLR500</b>                                    | Color 500 Pt-Co Units Calibration Standard                             |
| <b>42174</b>                                     | Ampoules 2 mL, for color reference solutions                           |
| <b>72671</b>                                     | Ampoules 10 mL, for color reference solutions                          |
| <b>1.14724</b>                                   | Empty cells with screw cap   |

The complete range of our color standards and accessories can be found at: [Color Standards](#)

## 5. UV/Vis Standards

Our UV/Vis standards are ideal for spectrophotometer calibration according to Ph. Eur specifications. They are suitable for general use following GLP, GMP, USP, ASTM and DIN ISO 9001:2008 method protocols.

### Features & Benefits

- CRMs and analytical standard grade conforming to internationally recognized standards
- Traceability to NIST
- Manufactured according to USP & Ph.Eur
- Double-certified solutions according to ISO/IEC 17025 and ISO 17034
- Following parameters can be determined using UV-VIS standards according to Ph Eur:
  - Absorbance
  - Stray light
  - Spectral resolution power
  - Wavelength accuracy



Use our UV/Vis standards during:

- The qualification process:
  - At instrument installation (new, old, or existing unqualified instrument)
  - After installation or major repair of an instrument
  - Periodically at specified intervals for each instrument
- The operation:
  - For quality control checks
  - For system suitability tests

**Table 5 UV-Vis Standards**

| Product Number | Product Name  |
|----------------|---|
| <b>1.04660</b> | UV-VIS Standard 1a: Potassium dichromate solution (600 mg/L), according to Ph. Eur. absorbance at 430 nm, Certipur®             |
| <b>1.08158</b> | Potassium dichromate standard solutions in sulfuric acid (0.01N), test set for calibrating the absorbance of spectrophotometers |
| <b>1.08159</b> | Holmium perchlorate standard solution, for the calibration of spectrophotometers  |
| <b>1.08160</b> | UV-VIS Standard 1: Potassium dichromate solution, according to Ph. Eur. absorbance, Certipur®                                   |
| <b>1.08161</b> | UV-VIS Standard 2: Sodium nitrite solution, according to Ph. Eur. stray light testing, Certipur®                                |
| <b>1.08163</b> | UV-VIS Standard 3: Sodium iodide solution, according to Ph. Eur. stray light testing, Certipur®                                 |
| <b>1.08164</b> | UV-VIS Standard 4: Potassium chloride solution, according to Ph. Eur. stray light testing, Certipur®                            |
| <b>1.08165</b> | UV-VIS Standard 5: Toluene solution in n-hexane, according to Ph. Eur. resolution power testing, Certipur®                      |
| <b>1.08166</b> | UV-VIS Standard 6: holmium oxide solution, reference material, according to Ph. Eur.  |

### 5.1. Color Measurement and Photometry according to DIN 5033, Part 9

Color measurement according to DIN 5033, part 9 specifications is possible using our primary reference material, Barium sulfate white standard. This has been certified by the PTB, National Metrological Institute of Germany.

**Table 6. Certipur® white standard**

| Product Number | Product Name                                   |
|----------------|--|
| <b>1.01748</b> | Barium sulfate white standard acc. to DIN 5033 |



# 6. Conductivity Standards

Our Certipur® reference materials for conductivity measurement are tested and certified by our own calibration lab, accredited according to ISO/IEC 17025. Additionally, we also have the ISO 17034 accreditation as reference material producer for conductivity standards.



## Features & Benefits

- Fresh and ready-to-use solutions
- No risk of contamination or residues
- Includes batch-specific, detailed Certificate of Analysis (COA)
- Traceable to PTB and NIST. Traceability procedures included in the COA for Certipur® reference materials.

## Certipur® Certified Conductivity Standards available in Practical Sachets

These conductivity sachets are designed for direct application into the field sample during environmental analysis (at the river or similar places). They are ideal for mobile analysis. In principle, you do not even need a beaker. To measure, the electrode can simply be inserted into the sachet.



**Table 7. Conductivity Standards**

| Product Number | Product Name   |
|----------------|--|
| 60136          | Potassium chloride solution, conductance standard B acc. to ISO 7888, KCl 0.01M  |
| 60138          | Potassium chloride solution, conductance standard C acc. to ISO 7888, KCl 0.001M |
| 60134          | Potassium chloride solution, conductance standard C acc. to ISO 7888, KCl 0.1M   |
| 06811          | Conductivity Standard, 200 µS/cm at 25 °C  |
| 56890          | Conductivity Standard, 300 µS/cm at 25 °C  |
| 41303          | Conductivity Standard, 400 µS/cm at 25 °C  |
| 06999          | Conductivity Standard, 500 µS/cm at 25 °C, KCl <= 2.5 % T                        |
| 06949          | Conductivity Standard, 1000 µS/cm at 25 °C                                       |
| 51795          | Conductivity Standard, 2000 µS/cm at 25 °C                                       |
| 44348          | Conductivity Standard, 3000 µS/cm at 25 °C                                       |
| 59962          | Conductivity Standard, 5000 µS/cm at 25 °C                                       |
| 51715          | Conductivity Standard, 20000 µS/cm at 25 °C                                      |
| 03729          | Conductivity Standard, 200000 µS/cm at 25 °C                                     |
| 56255          | Conductivity Standard, 50000 µS/cm at 25 °C                                      |
| 59777          | Conductivity Standard, 100000 µS/cm at 25 °C                                     |
| 66337          | Conductivity Standard, 300000 µS/cm at 25 °C                                     |
| 67233          | Conductivity Standard, 10000 µS/cm at 25 °C                                      |
| 91916          | Conductivity Standard, 30000 µS/cm at 25 °C                                      |
| COND25         | Conductivity Standard - 25 µmhos/cm, certified reference material                |

| Product Number | Product Name  |
|----------------|---|
| COND50         | Conductivity Standard - 50 µmhos/cm, certified reference material   |
| COND600        | Conductivity Standard - 600 µmhos/cm, certified reference material  |
| COND75         | Conductivity Standard - 75 µmhos/cm, certified reference material   |
| COND1412       | Conductivity Standard - 1412 µmhos/cm, certified reference material   |
| COND147        | Conductivity Standard - 147 µmhos/cm, certified reference material  |
| COND2060       | Conductivity Standard - 2060 µmhos/cm, certified reference material   |
| COND12800      | Conductivity Standard - 12800 mhos/cm, certified reference material   |
| 1.01810        | Conductivity water (nominal 0 mS/cm), Test solution for measurement of electrolytic conductivity, traceable to PTB and NIST Certipur® |
| 1.01811        | Potassium chloride solution (0.0001 mol/L)  |
| 1.01557        | Potassium chloride solution (0.001 mol/L)   |
| 1.01203        | Potassium chloride solution (0.01 mol/L)  |
| 1.01254        | Potassium chloride solution (0.1 mol/L)   |
| 1.01255        | Potassium chloride solution (1 mol/L)   |
| 1.01586        | Potassium chloride solution (0.001 mol/L), sachets  |
| 1.01553        | Potassium chloride solution (0.01 mol/L), sachets   |
| 1.01554        | Potassium chloride solution (0.1 mol/L), sachets  |

Discover our collection of conductivity standards: [Conductivity Standards](#)



# 7. Particle Size Standards

Particle size standards are widely used in industrial, pharmaceutical, clinical, and scientific laboratories. They are used to calibrate a wide variety of particle measuring devices such as flow cytometers, coulter counters, disc centrifuges, electron microscopes, optical particle counters and fully automatic, image-based cell analysis devices.

## Features & Benefits

- All products are traceable to the US NIST and/or the European Institute for Reference Materials and Measurements (IRMM).
- Only NIST and/or Bureau of Certified References (BCR) traceable reference materials are used for accurate sizing
- A certificate is supplied for each particle size, containing important particle data.

Explore the range of polydisperse particle size standards and sieve calibration standards from Whitehouse Scientific:

### 7.1. Polydisperse particle size standards

These NIST and NPL (National Physical Laboratory, UK) traceable standards are commissioned by the BCR. For certification of glass particles, several unambiguous primary methods such as microscopy, sieving, sedimentation, and coulter counter are used.

### 7.2. Sieve calibration standards

The sieve calibration standards from Whitehouse Scientific are used to calibrate sieves with traceabilities to NIST and NPL.

The calibration requires only about 2 minutes following a simple procedure: The glass microspheres are placed into the sieve which is shaken either manually or mechanically until an equilibrium has been reached and no particles pass through the sieve.

By weighing the sieve and the single-shot bottle before and after the calibration, the percentage of microspheres passing the sieve can be calculated and the mean aperture size of the sieve can thus be determined using the calibration graph supplied with the test certificate.

**Table 8. Micro particle Size, Polydisperse and Sieve Standards**

| Product Number | Product Name  |
|----------------|---|
| 77006          | Micro particles based on polymethacrylate, analytical standard, size: 60 µm                       |
| 80177          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 2.0 µm |
| 80304          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 3.0 µm |
| 81494          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 4.0 µm |
| 84192          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 8.0 µm |
| 87466          | Micro particle size standard based on polystyrene monodisperse, size: 9.0 µm                      |

| Product Number | Product Name   |
|----------------|--|
| 87896          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 20.0 µm |
| 88511          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 12.0 µm |
| 89756          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 6.0 µm  |
| 90515          | Micro particles based on polymethacrylate, analytical standard, size: 8 µm                         |
| 90875          | Micro particles based on polymethacrylate, analytical standard, size: 1 µm                         |
| 91329          | Micro particles based on melamine resin, analytical standard, size: 3 µm                           |
| 95523          | Micro particles based on melamine resin, analytical standard, size: 8 µm                           |
| 95531          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 30.0 µm |
| 95538          | Micro particles based on melamine resin, analytical standard, size: 12 µm                          |
| 72822          | Micro particle size standard based on polystyrene monodisperse, size: 10.0 µm                      |
| 72938          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 1.0 µm  |
| 95581          | Micro particle size standard based on polystyrene monodisperse, size: 0.2 µm                       |
| 95585          | Micro particle size standard based on polystyrene monodisperse, analytical standard, size: 0.5 µm  |
| 95611          | Micro particles based on melamine resin, Nile blue-marked, analytical standard, size: 10 µm        |
| 96003          | Micro particles based on melamine resin, rhodamine B-marked, size: 10 µm                           |
| 96062          | Micro particles based on melamine resin, analytical standard, size: 10 µm                          |
| 74161          | Micro particles based on polymethacrylate, analytical standard, size: 50 µm                        |
| 74214          | Micro particles based on polymethacrylate, analytical standard, size: 100 µm                       |
| 79807          | Micro particles based on polystyrene, analytical standard, size: 25 µm                             |
| 84135          | Micro particles based on polystyrene, analytical standard, size: 30 µm                             |
| 75776          | Micro particles based on melamine resin, carboxylate-modified, size: 6 µm                          |
| 74491          | Micro particles based on polystyrene, analytical standard, size: 20 µm                             |
| 74964          | Micro particles based on polystyrene, analytical standard, size: 15 µm                             |
| 56796          | Micro particles based on silicon dioxide, size: 0.5 µm   |
| 56798          | Micro particles based on silicon dioxide, size: 1.0 µm   |
| 56799          | Micro particles based on silicon dioxide, size: 0.15 µm  |
| 66373          | Micro particles based on silicon dioxide, size: 3 µm   |

| Product Number | Product Name  |
|----------------|---|
| 55463          | Micro particles based on polystyrene, dark blue, size: 10 µm            |
| 56314          | Micro particles based on polystyrene, dark red, size: 1 µm              |
| 61946          | Micro particles based on polystyrene, dark red, size: 10 µm             |
| 68553          | Micro particles based on polystyrene, dark blue, size: 3 µm             |
| 90938          | Micro particles based on polystyrene, dark blue, size: 100 µm           |
| 81715          | Micro particles based on melamine resin, rhodamine B-marked, size: 8 µm |
| 41295          | Micro particles based on melamine resin, size: 2 µm                     |
| 44054          | Micro particles based on silicon dioxide, size: 5 µm                    |
| 54375          | Micro particles based on silicon dioxide, size: 4 µm                    |
| 81108          | Micro particles based on silicon dioxide, size: 2 µm                    |

| Product Number | Product Name   |
|----------------|--|
| 07091          | Micro particle size standard based on polystyrene monodisperse, size: 200 µm |
| 59336          | Micro particle size standard based on polystyrene monodisperse, size: 100 µm |
| 00239          | Micro particles, magnetic, carboxy functionalized                            |
| 53572          | Micro particles, magnetic, amino functionalized                              |
| 73371          | Micro particles based on polymethacrylate, analytical standard, size: 4 µm   |
| 75845          | Micro particles based on melamine resin, carboxylate-modified, size: 3 µm    |
| 77523          | Micro particles based on polymethacrylate, analytical standard, size: 30 µm  |
| 49532          | Micro particles, magnetic, streptavidin coated, particle size 1 µm < 0.1 µm  |
| 79195          | Micro particles, magnetic, biotin coated, particle size 1 µm                 |

## 8. Viscosity Standards

Accurate viscosity measurements are key to reliable calibration and validation of viscometers employed in various industries such as Food & Beverage, Paint & Coatings, Pharmaceutical and Petroleum.

Our viscosity standards from Paragon Scientific Ltd are appropriate to measure kinematic and dynamic viscosity values of viscometers. CRMs are traceable to international standards BS EN ISO / IEC 17025 and ISO 17034 according to UKAS accreditation.

**We offer different types of viscosity standards:**

- 1. CCS Viscosity Standards (Cold Cranking Simulator):** Paragon ISO 17025 / ISO 17034 dual certified CCS Viscosity Standards are for the calibration and verification of analytical equipment used in Cold Cranking Simulator (CCS) oil testing to ASTM D5293 and SAE Specification J300.
- 2. Cone & Plate Viscosity Standards (CAP):** Paragon ISO 17025 / ISO 17034 dual certified Cone and Plate Viscosity Standards are specifically formulated for the paint and coatings industry and represent the most comprehensive range of standards available for this application.
- 3. General Purpose Viscosity Standards:** Paragon ISO 17025 / ISO 17034 dual certified General Purpose Viscosity Standards are tested in strict accordance with ASTM D2162, ("Standard Practice for basic calibration of master viscometers and viscosity standard oils").
- 4. Flow Cup Viscosity Standards:** Paragon ISO 17025 / ISO 17034 dual certified flow cup standards are especially designed for use in DIN, Ford, ISO, Shell and Zahn flow cups.
- 5. High Temperature Viscosity Standards:** Paragon ISO 17025 / ISO 17034 dual certified High Temperature Viscosity Standards are manufactured for temperatures between 20 °C and 150 °C and provide data for kinematic viscosity, dynamic viscosity and density.
- 6. High Temperature Viscosity Standards, 100 to 150 °C:** We also manufacture a range of High Temperature Viscosity Standards specifically for temperatures between 100 and 150 °C. These are dual certified to ISO 17034 and ISO 17025 and are specially formulated to provide values for kinematic viscosity, dynamic viscosity and density.
- 7. Low Temperature Viscosity Standards:** These standards are widely used for the verification of viscometers at sub-zero temperatures on routine basis. The use of Paragon ISO 17025 / ISO 17034 dual certified, low temperature standards can help provide confidence in overall system functionality including bath uniformity, bath stability, temperature measurement, timer accuracy and viscometer calibration.

Certified at 20°C and 25°C, each value is tested to ASTM D2162 for viscosity measurement and ASTM D1480 for density measurement.

| Product Number | Product Name  |
|----------------|---|
| 05724          | Polydisperse Particle Standard, Particle Size Standard, PS201, 10 x 0.05 g, 3-30 µm   |
| 08718          | Polydisperse Particle Standard, Particle Size Standard, PS315, 10 x 1.0 g, 10-100 µm  |
| 12655          | Sieve Standard, traceable to NIST SRM, 45 µm (325 mesh)                               |
| 40579          | Polydisperse Particle Standard, Particle Size Standard, PS314, 10 x 0.50 g, 10-100 µm |
| 42459          | Polydisperse Particle Standard, Particle Size Standard, PS192, 10 x 0.10 g, 1-10 µm   |
| 42696          | Sieve Standard, traceable to NIST SRM, 75 µm (200 mesh)                               |
| 49500          | Sieve Standard, traceable to NIST SRM, 63 µm (230 mesh)                               |
| 57563          | Polydisperse Particle Standard, Particle Size Standard, PS224, 10 x 0.50 g, 50-350 µm |

| Product Number | Product Name  |
|----------------|---|
| 78456          | Polydisperse Particle Standard, Particle Size Standard, PS226, 10 x 2.5 g, 50-350 µm  |
| 78900          | Sieve Standard, traceable to NIST SRM, 500 µm (35 mesh)                               |
| 80847          | Polydisperse Particle Standard, Particle Size Standard, PS213, 10 x 0.25 g, 10-100 µm |
| 94078          | Polydisperse Particle Standard, Particle Size Standard, PS202, 10 x 0.10 g, 3-30 µm   |
| 94773          | Polydisperse Particle Standard, Particle Size Standard, PS235, 10 x 2.5 g, 150-650 µm |

View our diverse list of particle size standards:  
[Particle Size Standards](#)

**8. Medical Viscosity Standards:** Tested in strict accordance with ASTM D2162, the primary method for viscosity standards calibration. These medical grade viscosity standards are fully traceable to national standards and are also test equipment compatible. Typically used, but not limited to, the calibration and verification of viscosity measuring equipment.

**9. Mineral Oil Rotational Viscosity Standards:** Paragon Scientific's Mineral Oil Rotational Viscosity Standards are the first-choice option where end users are unable to have silicone in their process. Dual certified to both ISO 17025 and ISO 17034 under UKAS accreditation, they provide both calibration and verification options for rotational viscometer test equipment. The dynamic viscosity at 20 & 25 °C is derived from the kinematic viscosity measured in strict accordance with ASTM D2162 and the density measured in strict accordance with ASTM D1480. Dynamic viscosity at intermediate temperatures is derived from the kinematic viscosity calculated in strict accordance with ASTM D341 and interpolated density measurements by calculation.

**10. Small Sample Viscosity Standards - ASTM D7279:** These standards are certified in strict accordance with ASTM D2162 at 40 °C and 100 °C under our ISO 17025 and ISO 17034 accreditation and have been manufactured specifically for the users of ASTM D7279, Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids by Automated Houillon Viscometer and other similar type test equipment.

**11. Silicone Rotational Viscosity Standards:** Paragon ISO 17025 / ISO 17034 dual certified Silicone Rotational Viscosity Standards are specifically formulated for use with rotational viscometers.

**We also offer Certified Viscosity Check Oils & Bath Media:**

- **Certified Viscosity Check Oils:** Paragon Scientific's range of Certified Viscosity Check Oils are manufactured and certified in accordance with the requirements of ISO 17025 and ISO 17034. Kinematic viscosity measurements have been made in accordance with ASTM D445, using Reference Viscometers certified in accordance with ASTM D446 and ASTM D2162. Density, Cold-Crank Simulator (CCS) and Viscosity Index measurements have been made in accordance with ASTM D4052, ASTM D5293 and ASTM D2270 respectively.
- **Bath Media:** Paragon bath fluids are formulated using high quality raw materials that facilitate optimum visibility, maximum heat stability and efficiency of thermostatic baths. The low viscosity aids dissipation of air bubbles which can lead to detection problems in automatic systems and ensures bath stability and uniformity are optimised.
- **Silicone Fluid Bath Media:**
  - Silicone Fluid Bath Media available for use at range of temperatures: 20 to 60 °C, 50 to 100 °C, 90 to 135 °C, and 120 to 150 °C
  - Kinematic viscosity (cSt) values at 25 °C

Browse our extensive portfolio of viscosity standards:  
[Viscosity Standards](#)

## 9. Turbidimetry Standards

The measurement of turbidity is an important method in water quality testing. Simply stated, turbidity is the measure of relative sample clarity. Turbidity can be expressed in nephelometric turbidity units (NTU).

Check out our turbidity standards for use in calibration and in checking the accuracy of your turbidity measurement instruments.

### Features & Benefits

- Analysis range: 0.5-4000 NTU
- Quality grade: CRM
- Traceable to the SI and higher order standards from NIST

Explore our turbidity standards: [Turbidity Standards](#)

**Table 9. Turbidimetry Standards**

| Product Number | Product Name                                       |
|----------------|--|
| TURB500        | Turbidity 500 NTU Calibration Standard - Formazin  |
| TURB50         | Turbidity 50 NTU Calibration Standard - Formazin   |
| TURB5          | Turbidity 5 NTU Calibration Standard - Formazin    |
| TURB05         | Turbidity 0.5 NTU Calibration Standard - Formazin  |
| TURB1000       | Turbidity 1000 NTU Calibration Standard - Formazin |
| TURB100        | Turbidity 100 NTU Calibration Standard - Formazin  |
| TURB10         | Turbidity 10 NTU Calibration Standard - Formazin   |
| TURB1          | Turbidity 1 NTU Calibration Standard - Formazin    |
| TURB20         | Turbidity 20 NTU Calibration Standard - Formazin   |
| TURB2          | Turbidity 2 NTU Calibration Standard - Formazin    |
| TURB4000       | Turbidity 4000 NTU Calibration Standard - Formazin |
| TURB4          | Turbidity 4 NTU Calibration Standard - Formazin    |

## 10. Melting Point Standards

Melting point is a useful property for identification of compounds and estimation of purity. We have a range of melting point standards that guarantee reliable performance of melting point equipment.

### Features & Benefits

- Traceable to primary standards (LGC, London)
- Grade: Analytical Standard
- Provided with Certificates of Analysis and Safety Data Sheet
- Two modes for melting point evaluation:
  - The Pharmacopeia mode
  - The Thermodynamic mode

Explore our melting point standards: [Melting Point Standards](#)

Learn about the two popular modes of melting point evaluation, along with the European Pharmacopoeia's approved method from this extensive technical flyer: [The Melting Point Standards Technical Flyer](#)



**Table 10. Melting Point Standards**

| Product Number | Product Name   |
|----------------|--|
| 73664          | Mettler-Toledo Calibration substance ME 18870, Benzophenone for the calibration of the thermosystem 900, traceable to primary standards (LGC)                      |
| 73983          | Mettler-Toledo Calibration substance ME 18555, Benzoic acid analytical standard, for the calibration of the thermosystem 900, traceable to primary standards (LGC) |
| 75035          | Mettler-Toledo Calibration substance ME 18872, Caffeine analytical standard, for the calibration of the thermosystem 900, traceable to primary standards (LGC)     |
| 76170          | Melting point standard 121-123 °C, analytical standard   |
| 01422          | Melting point standard 79-81 °C, analytical standard   |
| 41019          | Melting point standard 235-237 °C, analytical standard   |
| 42183          | Melting point standard 182-184 °C, analytical standard   |
| 50296          | Melting point standard 47-49 °C, analytical standard   |
| 67372          | Melting point standard 283-286 °C, analytical standard   |

| Product Number | Product Name  |
|----------------|---|
| 41131          | Mettler-Toledo Calibration substance ME 51143091, Saccharin, traceable to primary standards (LGC)         |
| 49143          | Mettler-Toledo Calibration substance ME 51143095, Potassium nitrate, traceable to primary standards (LGC) |
| 77634          | Mettler-Toledo Calibration substance ME 51143093, Vanillin, traceable to primary standards (LGC)          |
| 44770          | Mettler-Toledo Calibration substance ME 30034252, Phenyl salicylate, traceable to primary standards       |

| Product Number | Product Name  |
|----------------|---|
| 15809          | Mettler-Toledo Calibration substance ME 30130597, p-Toluamide, traceable to primary standards (LGC)                       |
| 04229          | Mettler-Toledo Calibration substance ME 30130610, Sodium methanesulfonate, traceable to primary standards LGC             |
| 42123          | Mettler-Toledo Calibration substance ME 30130599, Sodium acetate anhydrous, traceable to primary standards (LGC)          |
| 94993          | Mettler-Toledo Calibration substance ME 30130598, Methyltriphenylphosphoniumbromide, traceable to primary standards (LGC) |

## 11. Density standards

The use of density reference standards to calibrate density meters assures good laboratory practices (GLP) compliance and traceability to recognized national standards of mass, temperature, and pressure. Along with high-quality CRMs from Paragon Scientific Ltd., we also offer a collection of liquid density analytical standards from the respected density metrologists, H&D Fitzgerald Ltd.

### Features & Benefits

- Manufactured using UKAS-accredited hydrostatic weighing system
- Used to determine the accuracy of instrument and / or procedure of an analytical method
- CRMs and Analytical standard grade, tested following ASTM D4052 and ISO 12185 guidelines
- Certified according to ISO 17025 / 17034 specifications under UKAS between 15 °C to 150 °C

**Table 11. Density standards**

| Product Number | Product Name   |
|----------------|--|
| CRMDEGO        | Density Standard, ASTM D 4052; ISO 12185 (0.83294 g/mL, 15 °C)                                 |
| CRMUDEGO       | Density Standard, ASTM D 4052; IP 365 / ISO 12185 (0.8355 g/mL, 15 °C)                         |
| CRMDEGA        | Density Standard, ASTM D 4052; ISO 12185 (0.73576 g/mL, 15 °C)                                 |
| CRMDEKR        | Density Standard, ASTM D 4052; ISO 12185 (0.7933 g/mL, 15 °C)                                  |
| DEN10001       | Density Standard (100 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.768 g/mL, 100 °C       |
| DEN10003       | Density Standard (100 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8541 g/mL, 100 °C      |
| DEN15001       | Density Standard (150 °C), UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.7324 g/mL at 150 °C |
| DEN15002       | Density Standard (150 °C), UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.7795 g/mL at 150 °C |
| DEN15003       | Density Standard (150 °C), UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.8277 g/mL at 150 °C |
| DEN1501        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.6643 g/mL at 15 °C      |
| DEN1503        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8118 g/mL at 15 °C      |
| DEN1504        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8118 g/mL at 15 °C      |

| Product Number | Product Name  |
|----------------|---|
| DEN1507        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8782 g/mL at 15 °C |
| DEN1508        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.9413 g/mL at 15 °C |
| DEN1509        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.9829 g/mL at 15 °C |
| DEN1510        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0269 g/mL at 15 °C |
| DEN1511        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0695 g/mL at 15 °C |
| DEN1513        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.1963 g/mL at 15 °C |
| DEN1514        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.2878 g/mL at 15 °C |
| DEN2001        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.6597 g/mL at 20 °C |
| DEN2002        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.7264 g/mL at 20 °C |
| DEN2003        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.7788 g/mL at 20 °C |
| DEN2004        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8383 g/mL at 20 °C |
| DEN2005        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8556 g/mL at 20 °C |
| DEN2006        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8708 g/mL at 20 °C |
| DEN2007        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.9376 g/mL at 20 °C |
| DEN2008        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.9817 g/mL at 20 °C |
| DEN2009        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0257 g/mL at 20 °C |
| DEN2010        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0677 g/mL at 20 °C |
| DEN2507        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.9803 g/mL at 25 °C |
| DEN2508        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0242 g/mL at 25 °C |



| Product Number | Product Name  |
|----------------|---|
| DEN2509        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.0657 g/mL at 25 °C                             |
| DEN2510        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.1233 g/mL at 25 °C                             |
| DEN2012        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.1917 g/mL at 20 °C                             |
| DEN2013        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.2849 g/mL at 20 °C                             |
| DEN2014        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.6226 g/mL at 20 °C                             |
| DEN2502        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.7223 g/mL at 25 °C                             |
| DEN2503        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.775 g/mL at 25 °C                              |
| DEN2504        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8349 g/mL at 25 °C                             |
| DEN2512        | Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.2819 g/mL at 25 °C                             |
| DEN4001        | Density Standard (40 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.6415 g/mL at 40 °C                             |
| DEN4003        | Density Standard (40 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.794 g/mL at 40 °C                              |
| DEN4004        | Density Standard (40 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8247 g/mL at 40 °C                             |
| DEN4005        | Density Standard (40 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8706 g/mL at 40 °C                             |
| DEN5001        | Density Standard (50 °C), UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.787 g/mL at 50 °C                           |
| DEN5002        | Density Standard (50 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8269 g/mL at 50 °C                             |
| DEN5003        | Density Standard (50 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8649 g/mL at 50 °C                             |
| DEN6001        | Density Standard (60 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.796 g/mL at 60 °C                              |
| DEN6003        | Density Standard (60 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8675 g/mL at 60 °C                             |
| DEN8001        | Density Standard (80 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.7823 g/mL at 80 °C                             |
| DEN8002        | Density Standard (80 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8227 g/mL at 80 °C                             |
| DEN8003        | Density Standard (80 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8568 g/mL at 80 °C                             |
| DENWAT         | Pure Water Density Standard, UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.9982 g/mL at 20 °C, 0.9970 g/mL at 25 °C |
| DENWAT3        | Pure Water Density Standard, UKAS ISO/IEC17025 and ISO Guide 34 certified, 0.9982 g/mL at 20 °C, 0.9970 g/mL at 25 °C |
| CRMUDEGA       | Density Standard, ASTM D 4052; IP 365 / ISO 12185 (0.7377 g/mL, 15 °C)  |
| CRMUDEKR       | Density Standard, ASTM D4052; ISO 12185 (0.79672 g/mL, 15 °C)   |
| DEN10002       | Density Standard (100 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8103 g/mL at 100 °C                           |
| DEN4002        | Density Standard (40 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.7097 g/mL at 40 °C                             |
| DEN1506        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8628 g/mL at 15 °C                             |
| DEN1512        | Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.1283 g/mL at 15 °C                             |
| DEN2011        | Density Standard (20 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 1.1258 g/mL at 20 °C                             |

| Product Number | Product Name  |
|----------------|---|
| DEN6002        | Density Standard (60 °C), UKAS ISO/IEC17025 and ISO 17034 certified, 0.8243 g/mL at 60 °C |
| DEN2511        | Density Standard (25 °C)UKAS ISO/IEC17025 and ISO 17034 certified, 1.1869 g/mL at 25 °C   |
| 76081          | Density Standard 749 kg/m3, H&D Fitzgerald Ltd. Quality                                   |
| 76731          | Density Standard 870 kg/m3, H&D Fitzgerald Ltd. Quality                                   |
| 89353          | Density Standard 1191 kg/m3, H&D Fitzgerald Ltd. Quality                                  |
| 12156          | Density Standard 998 kg/m3, H&D Fitzgerald Ltd. Quality                                   |
| 15889          | Density Standard 1623 kg/m3, H&D Fitzgerald Ltd. Quality                                  |
| 44964          | Density Standard 692 kg/m3, H&D Fitzgerald Ltd. Quality                                   |
| 36232          | Density Standard 1251 kg/m3, H&D Fitzgerald Ltd. Quality                                  |

## 11.1 Relative Density Standards

Paragon ISO 17025 / ISO 17034 Relative Density Standards are designed for the calibration or verification of instruments used to measure density and relative density of materials at the desired test temperature within the range of 15 °C to 25 °C. All density measurements are made in accordance with ASTM D1480, for density and relative density (specific gravity).

**Table 12. Relative Density standards**

| Product Number | Product Name  |
|----------------|---|
| RDEN2501       | Relative Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 25/4 0.6552 at 25 °C |
| RDEN2505       | Relative Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 25/4 0.8693 at 25 °C |
| RDEN2503       | Relative Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 25/4 0.7730 at 25 °C |
| RDEN2504       | Relative Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 25/4 0.8366 at 25 °C |
| RDEN2501       | Relative Density Standard (25 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 25/4 0.6552 at 25 °C |
| RDEN1501       | Relative Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 15/4 0.6643 at 15 °C |
| RDEN1502       | Relative Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 15/4 0.7186 at 15 °C |
| RDEN1503       | Relative Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 15/4 0.7807 at 15 °C |
| RDEN1504       | Relative Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 15/4 0.8163 at 15 °C |
| RDEN1505       | Relative Density Standard (15 °C), UKAS ISO/IEC17025 and ISO 17034 certified, Relative Density 15/4 0.8494 at 15 °C |



| Product Number  | Product Name   |
|-----------------|--|
| <b>RDEN1506</b> | Relative Density Standard (15 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 15/4 0.8642 at 15 °C |
| <b>RDEN1507</b> | Relative Density Standard (15 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 15/4 0.8797 at 15 °C |
| <b>RDEN2006</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.8723 at 20 °C |
| <b>RDEN2001</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.6597 at 20 °C |

| Product Number  | Product Name   |
|-----------------|--|
| <b>RDEN2002</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.7145 at 20 °C |
| <b>RDEN2003</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.7769 at 20 °C |
| <b>RDEN2004</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.8400 at 20 °C |
| <b>RDEN2005</b> | Relative Density Standard (20 °C), UKAS ISO/ IEC17025 and ISO 17034 certified, Relative Density 20/4 0.8452 at 20 °C |

Explore more on our density and relative density standards: [Density and Relative Density Standards](#)

## 12. Total Suspended Solids (TSS)

TSS standards are used to measure total suspended solids or total dissolved salts in aqueous solution. We supply standards for measurements in the range of 5 mg/L to 1000 mg/L.

### Features & Benefits

- CRMs certified following ISO/IEC 17025 and ISO 17034
- Traceable to SI and higher order standards from NIST
- Delivered with a certificate of analysis including all information on use of the CRM
- Assigned value based on a purity determination by mass balance and gravimetrically prepared value

**Table 13. Total Suspended Solids**

| Product Number | Product Name  |
|----------------|---|
| <b>TDS1000</b> | Total Dissolved Solids 1000 mg/L Calibration Standard |
| <b>TDS1500</b> | TDS 1500 mg/L Calibration Std                         |
| <b>TSS1000</b> | Total Suspended Solids 1000 mg/L Calibration Standard |
| <b>TSS100</b>  | Total Suspended Solids 100 mg/L Calibration Standard  |
| <b>TSS10</b>   | Total Suspended Solids 10 mg/L Calibration Standard   |
| <b>TSS5</b>    | Total Suspended Solids 5 mg/L                         |

See our complete list of total suspended solids: [Total Suspended Solids](#)

# 13. Additional Physical Properties

We have a wide array of physical property standards in our offering that enable measurements including water hardness, distillation, and fuel testing—namely, aniline point and freezing point.

Fuel testing and distillation CRMs are suitable to standardize laboratory instruments used to analyze petroleum and derivatives. Distillation standards are applicable for distillation at atmospheric pressure following ASTM D86, IP 123, ISO 3405 and other similar international guidelines. Water hardness standards are employed in the testing and performance monitoring of hardness instruments.

## Features & Benefits

- Certified in accordance with ISO 17034 under accreditation by UKAS
- Fully traceable to the SI and higher order standards from NIST
- Guaranteed inter-laboratory correlation
- Low uncertainty values ensuring highest data accuracy
- Quality grades: CRM and analytical standard grade

**Table 14. Additional physical property standards**

| Product Number | Product Name  |
|----------------|---|
| Z804185        | Polystyrene calibration films for IR, NIST traceable  |
| Z804290        | Polystyrene calibration films for IR, Ph.Eur. certified   |
| HARD1000       | Hardness, Calcium 1000 mg/L Calibration Standard  |
| THRD1000       | Hardness, Total 1000 mg/L Calibration Standard  |
| CRMUDIGO       | Distillation Standard, ASTM D 86; IP 23 / ISO 3405 (168.5-360.1 °C)   |
| CRMDIGO        | Distillation Standard   |
| CRMDIGA        | Distillation Standard, ASTM D 86; NF EN ISO 3405 (30-178.6 °C)  |
| CRMUDIKR       | Distillation Standard, ASTM D 86; NF EN ISO 3405 (148.1 - 260.3 °C)   |
| CRMUMPGO       | Diesel, Multi-Parameter Certified Reference Material  |
| CRMAPKR        | Aniline Point Standard, ASTM D 611 (62.30 °C)   |
| CRMUAPKR       | Aniline Point Standard, ASTM D 611 (58.90 °C)   |
| CRMUPPGO       | Pour Point Standard, IP15, ASTM D97, ISO 3016, BS 2000, Pt 15 (-34 °C)  |
| CRMUPPLU       | Pour Point Standard, IP15, ASTM D97, ISO 3016, BS 2000, Pt 15   |
| CRMUCFGO1      | CFPP Standard, CFPP ASTM D 6371; EN 116 / IP 309 (-17.4 °C)   |
| CRMUFRKR       | Freezing Point Standard, ASTM D 2386 (-54.1 °C)   |
| CRMUCPGO       | Cloud Point Standard  |
| CRMENGO        | Cetane Number Standard  |
| CRMADKR        | Acidity Standard, ASTM D 3242 (0.0021 mg KOH/g)- move to "Certified Reference Materials " under fuels testing   |
| CRMUADKR       | Acidity Standard, ASTM D 3242 (0.0083 mg KOH/g) )- move to "Certified Reference Materials " under fuels testing |

# 14. Flash Point Standards

We offer certified flash point standards from Paragon Scientific Ltd for verification of laboratory instruments and routine monitoring of quality of your petroleum-based products.

## Features & Benefits

Based on the flash point method where these standards are used, they are categorized into 2 types:

| ASTM D92 Cleveland Open Cup Flash Point CRM  | ASTM D93 (Procedure A) Pensky- Martens Closed Cup Flash Point CRM  |
|--|--|
| CRM for annual verification  | CRM for annual verification  |
| checks in accordance with ASTM D92   | checks in accordance with ASTM D93   |
| Certified in strict accordance with ISO 17025 / ISO 17034 under our UKAS accreditations by a means of a method specific inter-laboratory study | Certified in strict accordance with ISO 17025 / ISO 17034 under our UKAS accreditations by a means of a method specific inter-laboratory study |
| Fully traceable to international standards   | Fully traceable to international standards   |

Some other common standardized test methods for measuring flash point are Pensky-Martens closed cup (ASTM D93; IP 34), Cleveland Open Cup (ASTM D92; IP 36), TAG (ASTM D56) and Abel (IP 170, IP 304) closed cup methods.

**Table 15. Flash Point Standards**

| Product Number  | Product Name   | Product Number  | Product Name  |
|---|--|---|---|
| <b>ASTM D92 Cleveland Open Cup Flash Point Certified Reference Material</b> |  | <b>ASTM D93 (Procedure A) Pensky- Martens Closed Cup Flash Point CRMs (Continued)</b> |   |
| FPCOC1  | Flash Point Standard - Cleveland Open Cup, ASTM D 92 (85 °C)       | FPPMCC3   | Flash Point Standard - Pensky Martens, ASTM D 93 Proc. A (116.0 °C) |
| FPCOC3  | Flash Point Standard - Cleveland Open Cup, ASTM D 92 (148 °C)      | FPPMCC4   | Flash Point Standard - Pensky Martens, ASTM D 93 Proc. A (143.0 °C) |
| FPCOC4  | Flash Point Standard - Cleveland Open Cup, ASTM D 92 (188 °C)      | FPPMCC5   | Flash Point Standard - Pensky Martens, ASTM D 93 Proc. A (184.0 °C) |
| FPCOC5  | Flash Point Standard - Cleveland Open Cup, ASTM D 92 (257 °C)      | FPPMCC6   | Flash Point Standard - Pensky Martens, ASTM D 93 Proc. A (232.0 °C) |
| FPCOC6  | Flash Point Standard - Cleveland Open Cup, ASTM D 92 (112 °C)      | <b>Flash Point Standards for other methods</b>  |   |
| CRMCOCHIGH  | Flash Point Standard, COC ASTM D 92 (262.0 °C)                     | FPPMCC1   | Flash Point Standard - Pensky Martens                               |
| CRMCOCLOW   | Flash Point Standard, COC ASTM D 92 (85.0 °C)                      | CRMUABKR  | Flash Point Standard, Abel IP 170 (41.2 °C)                         |
| CRMCOCMID   | Flash Point Standard, COC ASTM D 92 (153.0 °C)                     | CRMUFCLU  | Flash Point Standard, COC ASTM D 92 (256.8 °C)                      |
| <b>ASTM D93 (Procedure A) Pensky- Martens Closed Cup Flash Point CRMs</b>   |  | CRMUPMLU  | Flash Point Standard, PMCC ASTM D 93 Proc B (190.5 °C)              |
| CRMUPMLUB   | Flash Point Standard, PMCC ASTM D 93 Proc B (105.7 °C)             | CRMABKR   | Flash Point Standard, Abel IP 170 (41.9 °C)                         |
| CRMUPMCCMID   | Flash Point Standard, PMCC ASTM D 93 Proc A (141.0 °C)             | CRMTAKR   | Flash Point Standard, TAG ASTM D56 (43.1 °C)                        |
| CRMUPMCCHIGH  | Flash Point Standard, PMCC ASTM D 93 Proc A (228.0 °C)             |   |   |
| CRMUPMCCLOW   | Flash Point Standard, PMCC ASTM D 93 Proc A (77.5 °C)              |   |   |
| CRMUPMGO  | Flash Point Standard, PMCC ASTM D 93 Proc A (57.3 °C)              |   |   |
| FPPMCC2   | Flash Point Standard - Pensky Martens, ASTM D 93 Proc. A (76.5 °C) |   |   |

Find a complete list of our flash point reference materials: [Flash Point Standards](#)

# 15. Acidity/Total Acid Number (TAN) Standard

Paragon TAN CRMs are specifically manufactured for the verification of analytical instruments used to determine acid number by potentiometric titration.

## Features & Benefits

- Tested and certified in accordance with ASTM D664/IP 177 (Total Acid Number Standards) & ASTM D 3242/IP 354 (Acidity Standards)
- Manufacture and certification processes are carried out in strict accordance with Paragon Scientific's dual UKAS accreditations to ISO 17025 & ISO 17034

Click below to discover the complete list of acidity/total acid number (TAN) reference materials:  
[Acidity/total acid number \(TAN\) Standards](#)

**Table 16. Acidity/TAN Standards**

| Product Number | Product Name  |
|----------------|---|
| TAN030         | Total Acid Number Standard, ASTM D664 (2.93 mg KOH/g) |
| TAN001         | Total Acid Number Standard, ASTM D664 (0.10 mg KOH/g) |
| TAN025         | Total Acid Number Standard, ASTM D664 (2.48 mg KOH/g) |
| TAN005         | Total Acid Number Standard, ASTM D664 (0.49 mg KOH/g) |
| TAN015         | Total Acid Number Standard, ASTM D664 (1.54 mg KOH/g) |
| TAN050         | Total Acid Number Standard, ASTM D664 (4.57 mg KOH/g) |

# 16. Alkalinity or Total Base Number (TBN) Standards

Our TBN CRMs from Paragon Scientific Ltd. are specifically manufactured for the verification of TBN by potentiometric titration, a technique used in, but not limited to, the analysis of used oils and lubricants.

## Features & Benefits

- Tested and certified in accordance with ASTM D2896/IP 276
- The manufacture and certification processes are carried out in strict accordance with Paragon Scientific's dual UKAS accreditations to ISO 17025 & ISO 17034
- This dual accreditation ensures the highest level of accreditation guarantee and provides the most credible certified data available worldwide.

**Table 17. Alkalinity/TBN Standards**

| Product Number | Product Name  |
|----------------|---|
| TBN10          | Alkalinity Standard, Total Base number Standard ASTM D2896 (10.01 mg KOH/g) |
| TBN 1          | Total Base number Standard ASTM D2896 (0.99 mg KOH/g)                       |
| TBN30          | Total Base number Standard ASTM D2896 (30.17 mg KOH/g)                      |
| TBN 3          | Total Base number Standard ASTM D2896 (3.01 mg KOH/g)                       |
| TBN6           | Total Base number Standard ASTM D2896 (6.06 mg KOH/g)                       |

| Product Number | Product Name   |
|----------------|--|
| TBN70          | Total Base number Standard ASTM D2896 (70.24 mg KOH/g) |
| TBN15          | Total Base number Standard ASTM D2896 (15.17 mg KOH/g) |

Explore our alkalinity/total base number (TAN) standards: [Alkalinity/Total Base Number Standards](#)

# 17. Refractive Index Standards

We offer Refractive Index standards CRMs manufactured by Paragon Scientific Ltd.

## Features & Benefits

- All measurements are fully traceable to NIST and international protocols
- CRM grade standards ideal for the verification and calibration of temperature-controlled refractometers
- Certified values for refractive Index measurements at 20 °C, 25 °C and 30 °C.



**Table 18. Refractive Index Standards**

| Product Number | Product Name   |
|----------------|--|
| PSRI01         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI01K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI02         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI02K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI03         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI03K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI04         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI04K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI05         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI05K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI06         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI06K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI08         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI08K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI09         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI09K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI10         | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |

| Product Number | Product Name   |
|----------------|--|
| PSRI10K        | Refractive Index Standard at 20 °C, 25 °C, and 30 °C |
| PSRI07         | Refractive Index Standard at 20 °C 25 °C and 30 °C   |
| PSRI07K        | Refractive Index Standard at 20 °C 25 °C and 30 °C   |
| 5.00400        | Refractive index standard                            |
| 5.00405        | Refractive index standard                            |
| 5.00410        | Refractive index standard                            |
| 5.00420        | Refractive index standard                            |
| 5.00430        | Refractive index standard                            |
| 5.00440        | Refractive index standard                            |
| 5.00450        | Refractive index standard                            |
| 5.00460        | Refractive index standard                            |
| 1.08962        | Refractive index standard Kit 1                      |
| 1.08961        | Refractive index standard Kit 2                      |

Find detailed information about refractive index standards in [Analytix Reporter Journal Issue 4/2018](#) (page no. 28). Subscribe to Analytix Reporter and download all issues at [SigmaAldrich.com/analytix](http://SigmaAldrich.com/analytix).

# 18. Refractive Index and Density Multi-Parameter CRMs

Paragon Scientific manufactured Index and Density Certified Reference Materials provide a flexible, cost-effective and efficient solution for any laboratory calibrating and/or verifying refractive index and density measurements – from a single material.

**Table 19 Refractive Index and Density Multi-Parameter CRMs**

| Product Number | Product Name  |
|----------------|---|
| PSRVD01        | Multi-Parameter Refractive Index Density Certified Reference Material at 15 °C, 20 °C and 25 °C, Single 30 mL |
| PSRVD02        | Multi-Parameter Refractive Index Density Certified Reference Material at 15 °C, 20 °C and 25 °C, Single 30 mL |

| Product Number | Product Name  |
|----------------|---|
| PSRVD03        | Multi-Parameter Refractive Index Density Certified Reference Material at 15 °C, 20 °C and 25 °C, Single 30 mL |
| PSRVD04        | Multi-Parameter Refractive Index Density Certified Reference Material at 15 °C, 20 °C and 25 °C, Single 30 mL |

## 19. Redox Standards

Our redox standards from Reagecon are employed as control standards rather than calibration standards because redox electrodes do not need calibration. Such standards not only control the functionality of the sensing and reference electrodes but also control the analyst's technique, environmental conditions, and the operation of the measurement meter (pH meter in millivolt (mV) mode).

### Features & Benefits

- Broad range of values (124 mV – 650 mV)
- Detailed Safety Data Sheets available online
- Certified with proven verifiable accuracy and uncertainty of measurement

Find our complete collection of redox standards:  
[Redox Standards](#)

**Table 20. Redox Standards**

| Product Number | Product Name           |
|----------------|------------------------|
| 04887          | Redox standard, 124 mV |
| 13198          | Redox standard, 250 mV |
| 40661          | Redox standard, 200 mV |
| 80138          | Redox standard, 600 mV |
| 87783          | Redox standard, 650 mV |
| 78855          | Redox standard, 465 mV |

## 20. Biological Oxygen Demand (BOD)/ Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) Standards

BOD is the amount of oxygen consumed by the microorganisms to decompose the organic matter in wastewater. COD is the measure of the amount of oxygen that would be required to oxidize organic pollutants present in water or wastewater. TOC has become an important parameter used to monitor overall levels of organic compounds present in wastewater in terms of total carbon content.

For these analyses, we provide CRMs and analytical grade standards as ready-to-use solutions for calibration purposes and as CRM matrix materials.

**Table 21. BOD/COD, TOC Standards**

| Product Number | Product Name  | Product Number | Product Name   |
|----------------|---|----------------|--|
| 1.09017        | TOC standard solution, according to EN 1484-H3, according to DIN 38409-H3, potassium hydrogen phthalate water 1000 mg/L stabilized, Certipur® | 94450          | TOC standard, according to ISO/CEN EN1484, 50 mg/L +/- 2 mg/L    |
| 70961          | TOC standard, according to ISO/CEN EN1484, 100 mg/L +/- 5 mg/L  | 95781          | TOC standard, according to ISO/CEN EN1484, 250 mg/L +/- 5 mg/L   |
| 76067          | TOC standard, according to ISO/CEN EN1484, 1000 mg/L +/- 10 mg/L  | TOC1000        | TOC 1000 mg/L Calibration Standard, certified reference material |
| 76319          | TOC standard, according to ISO/CEN EN1484, 500 mg/L +/- 10 mg/L   | TOC100         | TOC 100 mg/L Calibration Standard, certified reference material  |
| 90326          | TOC standard, according to ISO/CEN EN1484, 25 mg/L +/- 2 mg/L   | BOD200         | BOD 200 mg/L Calibration Standard, certified reference material  |
|                |   | BOD500         | BOD 500 mg/L Calibration Standard, certified reference material  |



| Product Number | Product Name   |
|----------------|--|
| <b>COD500</b>  | COD 500 mg/L Calibration Standard, certified reference material  |
| <b>BOD1000</b> | BOD 1000 mg/L Calibration Standard, certified reference material |
| <b>BOD2000</b> | BOD 2000 mg/L Calibration Standard, certified reference material |

| Product Number    | Product Name  |
|-------------------|---|
| <b>A-2045-040</b> | TOC-Calibration Kit, 25 mg TOC                                      |
| <b>A-2050-040</b> | TOC-Calibration Kit, 50 mg TOC                                      |
| <b>1.00718</b>    | BOD Standard, EN 1899 analogous, 190-230 mg/L, 10 1L, Spectroquant® |

## 21. Gel Permeation Chromatography (GPC) Standards

We offer a range of GPC standards which are mainly used to calibrate the instrument for the GPC analysis. Gel permeation chromatography/size-exclusion chromatography (GPC/SEC) standards can be used in general to validate a system, a detector, or to verify your own operational procedures. Another important application of these standards is to create a GPC/SEC calibration curve which helps in:

- determine molar mass distributions and averages for unknown samples
- measure pore sizes for porous materials
- quantify the resolution of GPC/SEC columns

Explore our GPC Standards: [GPC Standards](#)

**Pullulan Standards:** Pullulan Standards are certified reference Material grade standards. They are mostly used to obtain molecular mass distribution of cellulosic samples. It mainly consists of polymaltotriose units linked together by  $\alpha$ -(1→6) linkages.

Explore our Pullulan Standards: [Pullulan Standards](#)



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