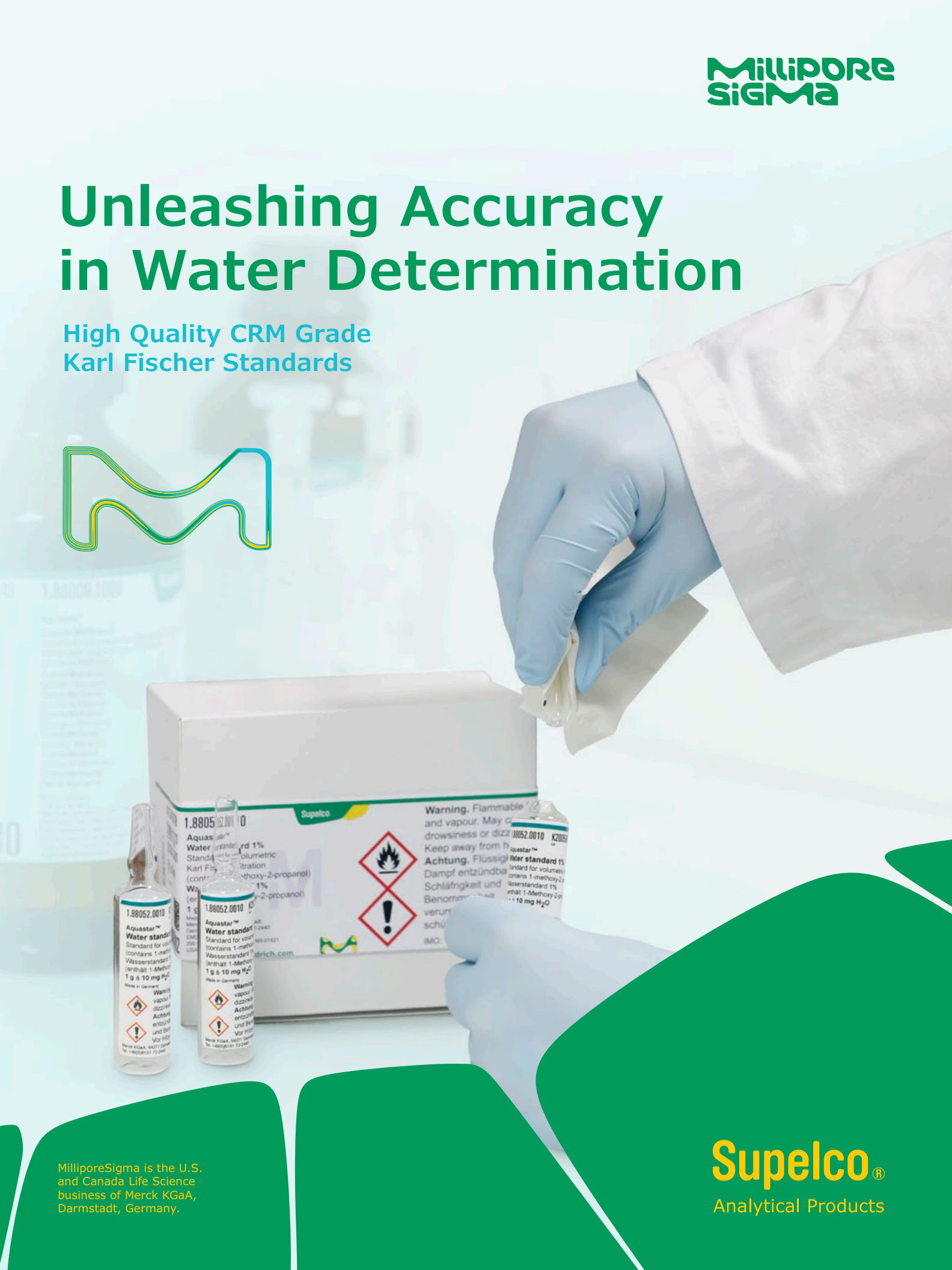
Unleashing Accuracy in Water Determination

High Quality CRM Grade Karl Fischer Standards



MilliporeSigma is the U.S. and Canada Life Science business of Merck KGaA, Darmstadt, Germany.

Supelco®
Analytical Products

Karl Fischer Standards for Accurate Water Determination:

The Aquastar® line of Karl Fischer reagents and Certified Reference Materials (CRMs) provides a reliable and convenient system of products for precise water content determination. Karl Fischer titration is widely recognized as the “gold standard” for measuring water content in samples of gases, liquids, and solids..

The demand for transparent and comparable analytical results, especially for water determinations using Karl Fischer, is increasing globally. To ensure accurate results, reliable reference materials are essential. Our Aquastar® product line provides excellent standards for Karl Fischer equipment monitoring, titer determination, and result verification. These water standards are manufactured under strict control in accordance with ISO 17034 and characterized in accordance with ISO/IEC 17025.

INTRODUCING

Unmatched portfolio of high-quality CRM grade Aquastar® line of Karl Fischer water standards

Emphasized by its inclusion in various Pharmacopoeias, American Standard Methods (ASTM), ISO regulations, and industry norms, water determination is made effortless with our Aquastar® water standards. Our globally available Karl Fischer product line ensures reliability, speed, and accuracy, enabling seamless international product transfer. Trust in our adherence to regulations and traceability, including ASTM, ISO, NIST, and the European Pharmacopeia (EP).

Experience the gold standard in water determination today.

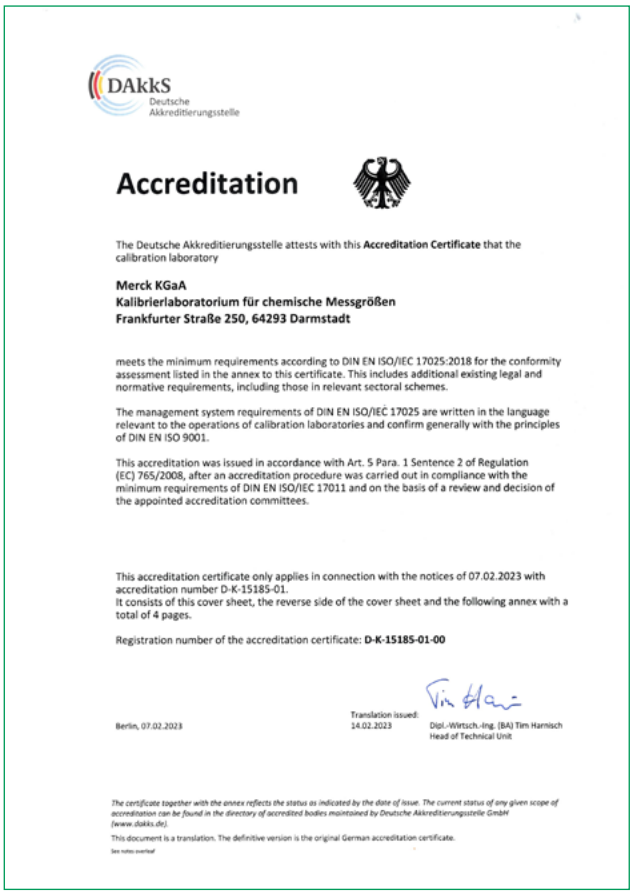
NO DOUBTS. NO DELAYS. JUST ACCURACY

Darmstadt, Germany

Aquastar® Karl Fischer Standards & Reagents
Certipur® inorganic and elemental CRMs

- Contract labs and Accredited Labs
- Pharmaceutical Industry BioTechnology
- Chemical/ Petrochemical Industry
- Food & Beverage Manufacturers
- Cosmetic Industry
- Environmental Testing
- Agriculture Industry
- Academia
- Battery Producer/ Automobile Producer
- Mining Industry

Our CRM-grade Karl Fischer Standards have been analyzed in our ISO/IEC 17025 accredited calibration laboratory and are manufactured under ISO 17034 accreditation.



DAkkS
Deutsche Akkreditierungsstelle

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**

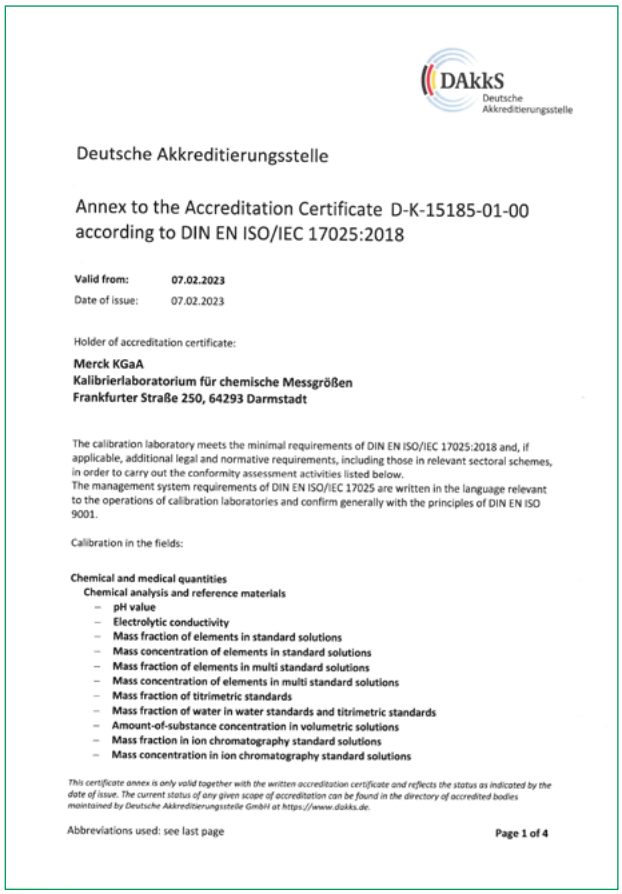
Berlin, 07.02.2023

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).

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



DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15185-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **07.02.2023**
Date of issue: 07.02.2023

Holder of accreditation certificate:

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

The calibration laboratory meets the minimal requirements of DIN EN ISO/IEC 17025:2018 and, if applicable, additional legal and normative requirements, including those in relevant sectoral schemes, in order to carry out the conformity assessment activities listed below.
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.

Calibration in the fields:

Chemical and medical quantities
Chemical analysis and reference materials
- **pH value**
- **Electrolytic conductivity**
- **Mass fraction of elements in standard solutions**
- **Mass concentration of elements in standard solutions**
- **Mass fraction of elements in multi standard solutions**
- **Mass concentration of elements in multi standard solutions**
- **Mass fraction of titrimetric standards**
- **Mass fraction of water in water standards and titrimetric standards**
- **Amount-of-substance concentration in volumetric solutions**
- **Mass fraction in ion chromatography standard solutions**
- **Mass concentration in ion chromatography standard solutions**

This certificate annex is only valid together with the written accreditation certificate and 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 at https://www.dakks.de.

Abbreviations used: see last page

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Important Links

- Aquastar® Karl Fischer Standards
- Aquastar® reagents for Volumetric & Coulometric Karl Fischer Titration
- Supelco® SmartChemicals for Titration
- Karl Fischer Titration Video
- Titration 4.0

Aquastar® Water Standards:

Karl Fischer (KF) titration is one of the most rapid and accurate methods to determine water content in various samples. For accurate KF titration, high quality Certified Reference Materials (CRMs) are essential.

Our Aquastar® product line offers a series of excellent standards mainly used in:

- Monitoring Karl Fischer equipment as part of a routine quality control to ensure accuracy and to proactively identify instrument issues.
- Performing titer determination of volumetric Karl Fischer reagents.
- Validation of the measuring results to evaluate their accuracy and the performance of the titration process.

(A) Product Nos: 1.88050, 1.88051 & 1.88052, Water standards in ampoules

The Aquastar® product range offers water standards in ampoules with different water contents (0.01%, 0.1% & 1%). The standards consist of solvent mixtures with a defined water content.

Advantages:

- Tested against NIST - National Institute of Standards and Technology, Gaithersburg, USA.
- Includes a batch-specific certificate detailing measured water content, uncertainty data, measuring method, NIST SRM, and minimum shelf-life.
- Recommended storage is tightly closed in the original container at temperatures between +15 °C and +25 °C.

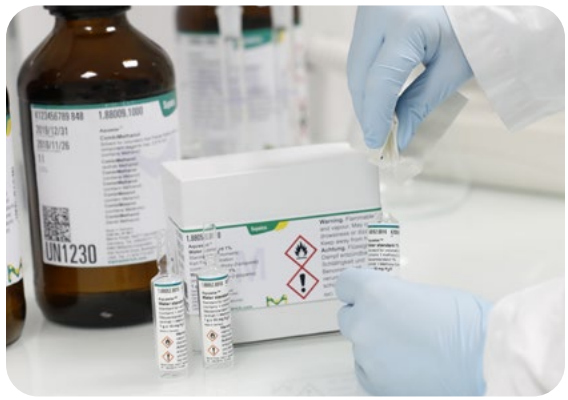

Fig. 1 Water standards in ampoules

(B) Product No.: 1.88054, Water standard oven 1%

This standard is a solid standard suitable for use in the Karl Fischer oven method. The composition of this standard is based on inorganic substances, which are stable even at high temperatures.

Advantages:

- Compared to other solid standards based on organic substances like lactose, citrate, or tartrate, this standard has a significantly lower water content of only 1%.
- It can be used within a wide temperature range of 150–400 °C.
- The low water content of 1% is especially suitable for Karl Fischer ovens with a coulometer.
- Each package includes a batch-specific certificate stating the precise measured water content, uncertainty data, measuring method, and minimum shelf-life.

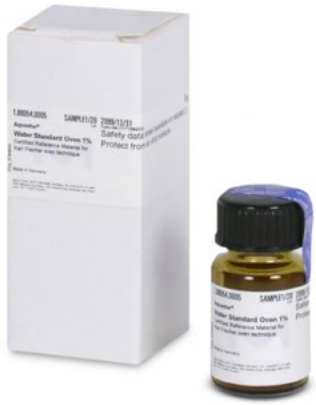

Fig. 2 Oven standard

(C) Product No.: 1.88055, Water standard oil 15 – 30 ppm

This standard is suitable for use when we need to determine the water content in oil samples.

Advantages:

- The water standard precisely matches the low water content and matrix of oil samples, making it ideal for water determination in oils.
- The certificate specifies the exact value for each batch.
- The practical ampoules ensure convenient handling.

Fig. 3 Water Standard Oil

(D) Product No.: 1.12939, Lactose standard 5%

The Aquastar® lactose standard is a solid standard containing approximately 5% water. The batch-specific Certificate of Analysis provides the precise water content for each batch. This versatile standard can be utilized in both coulometric and volumetric Karl Fischer titrations, thanks to its solubility in methanol and water content. It is particularly useful when working with solvent mixtures where sodium tartrate dihydrate has low solubility. Additionally, it can serve as an oven standard within a temperature range of 140-160 °C.

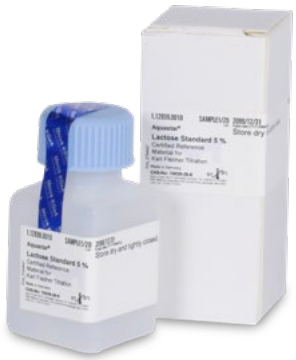

Fig. 4 Lactose Standard

(E) Product No: 1.06664, Sodium tartrate dihydrate 15.66%

Sodium tartrate dihydrate is a solid standard used in volumetric Karl Fischer titration. It contains a stoichiometric water content of 15.66% and is suitable for titer determination and result verification.

Fig. 5 Sodium Tartrate Dihydrate

(F) Product No.: 1.09259, Water standard 5 mg/mL

This liquid water standard is derived from a long-chain alcohol. It reliably maintains the adjusted water content even after the bottle is opened under normal conditions. While suitable for daily titer control, it is not recommended for precise titer determinations.

Ordering information

Product Designation	Packaging & Qty	Format	SKU No.	Intended Use/ Applications
Water Standard 0.01 % Reference Material for coulometric Karl Fischer Titration 1 g ≙ 0.1 mg H_2O Aquastar®	10x8 mL (Glass Ampoule)	Solution	1880500010 1880500013*	Coulometric & Volumetric Karl Fischer (KF) Method
Water standard 0.1% Certified Reference Material for coulometric Karl Fischer Titration 1 g ≙ 1 mg H_2O Aquastar®	10x8 mL (Glass Ampoule)	Solution	1880510010 **(for Rest of the world- not for NA)** 1880510012 **(for NA only)** 1880510313* **(for NA only)** 1880510013* **(for Rest of the world-not for NA)**	Coulometric & Volumetric Karl Fischer (KF) Method
Water standard 1% Certified Reference Material for volumetric Karl Fischer Titration 1 g ≙ 10 mg H_2O Aquastar®	10x8 mL (Glass Ampoule)	Solution	1880520010 **(for Rest of the world-not for NA)** 1880520012 **(for NA only)** 1880520313* **(for NA only)** 1880520013* **(for Rest of the world-not for NA)**	Volumetric KF Method
Water Standard Oven 1% Certified Reference Material for KF oven method Aquastar®	5 g (Glass Bottle)	Solid	1880540005	KF oven method
Water standard oil Certified Reference Material for Karl Fischer Titration (oil matrix 15-30 ppm H2O) Aquastar®	10x8 mL (Glass Ampoule)	Solution	1880550010 1880550013*	Coulometric KF Method (for oil samples) & Oven Method
Lactose Standard 5 % Certified Reference Material for Karl Fischer Titration Aquastar®	10 g (Plastic Bottle)	Solid	1129390010 1129390013*	Coulometric KF Method (for oil samples) & Oven Method
Sodium tartrate dihydrate Certified Reference Material for Karl Fischer Titration 15.66% Aquastar®	100 g (Plastic Bottle)	Solid	1066640100 1066640103*	Volumetric KF Method
Water standard 5 mg/ml (1 ml contains 5 mg H_2O) Aquastar®	250 mL (Glass Bottle)	Solution	1092590250	Daily titer control

*SKU-pack size numbers ending with a “3” are SmartChemicals with an RFID tag on the label for seamless data transfer to the instrument.

Supelco®
Analytical Products

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400 Summit Drive
Burlington, MA 01803

SigmaAldrich.com

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