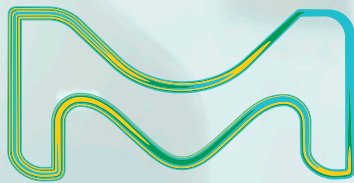


# Unleashing Accuracy in Water Determination

High Quality CRM Grade  
Karl Fischer Standards



The Life Science business  
of Merck operates as  
MilliporeSigma in the  
U.S. and Canada.

**Supelco**®  
Analytical Products

# Karl Fischer Standards for Accurate Water Determination:

The Aquastar® line of Karl Fischer titrants and Certified Reference Materials (CRMs) provides a reliable and convenient system of reagents 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 Pharmacopoeia (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 according to ISO 17034 specifications.



## 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.  
 See notes overleaf



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 Page 1 of 4

## 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 (1-Methoxy-2-propanol) 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 batch, 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 100–300 °C.
- In contrast, decomposition reactions with the formation of water may occur at temperatures above 200 °C when using organic substances, leading to inaccurate outcomes. 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 140-190 °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 precise water content of 15.66% and is suitable for titer determination and result verification.



**Fig. 5** Sodium tartrate

**(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.

# Supelco® SmartStandards for Digital Titration

Experience the cutting edge Supelco® SmartStandards (SKU-pack size numbers ending with a “3”), incorporating advanced titration technology. With a simple touch on the SmartChemical RFID tag, data seamlessly transfers to the titrator, guaranteeing time savings, error reduction, and uncompromised data integrity. Stay ahead with smarter titration solutions.

With a simple touch, data can be transferred seamlessly and rapidly



Seamless data transfer from COA to titrator



**Name**  
Purity/Assay  
Molecular weight  
Lot/batch no  
Article no  
Supplier  
Compliance  
Uncertainty  
Expiry date  
Initial operation date



## Unlock the advantages of SmartStandards for your titration:

- **Secure data transfer:** Safeguard accurate reagent and standard data transfer within the titration software.
- **User-friendly experience:** Intuitive operation and one-touch data transfer for seamless convenience.
- **Enhanced quality management:** Access titer determination, shelf life, compliance data, initial opening date, and release date.
- **Boosted efficiency:** Experience rapid data transfer, saving time and eliminating the need for manual writing and the four-eyes principle.

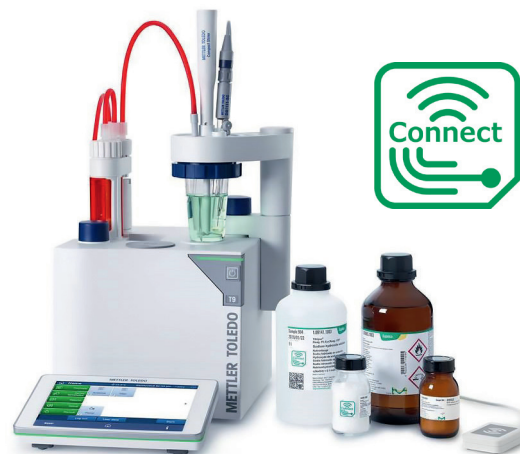


Fig. 6 SmartChemicals for Digital KF Titration

## 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 <sub>2</sub> O Aquastar®	10x8 mL (Glass Ampoule)	Solution	<a href="#">1880500010</a> <a href="#">1880500013*</a>	Coulometric & Volumetric Karl Fischer (KF) Method
Water standard 0.1% Certified Reference Material for coulometric Karl Fischer Titration 1 g ± 1 mg H <sub>2</sub> O Aquastar®	10x8 mL (Glass Ampoule)	Solution	<a href="#">1880510010</a> (for Rest of the world- not for NA) <a href="#">1880510012</a> (for NA only) <a href="#">1880510313*</a> (for NA only) <a href="#">1880510013*</a> (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 <sub>2</sub> O Aquastar®	10x8 mL (Glass Ampoule)	Solution	<a href="#">1880520010</a> (for Rest of the world-not for NA) <a href="#">1880520012</a> (for NA only) <a href="#">1880520313*</a> (for NA only) <a href="#">1880520013*</a> (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	<a href="#">1880540005</a>	KF oven method
Water standard oil Certified Reference Material for Karl Fischer Titration (oil matrix 15-30 ppm H <sub>2</sub> O) Aquastar®	10x8 mL (Glass Ampoule)	Solution	<a href="#">1880550010</a> <a href="#">1880550013*</a>	Coulometric KF Method (for oil samples) & Oven Method
Lactose Standard 5 % Certified Reference Material for Karl Fischer Titration Aquastar®	10 g (Plastic Bottle)	Solid	<a href="#">1129390010</a> <a href="#">1129390013*</a>	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	<a href="#">1066640100</a> <a href="#">1066640103*</a>	Volumetric KF Method
Water standard 5 mg/ml (1 ml contains 5 mg H <sub>2</sub> O) Aquastar®	250 mL (Glass Bottle)	Solution	<a href="#">1092590250</a>	Daily titer control

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



To place an order or receive technical assistance in Europe, please call Customer Service:  
 France: 0825 045 645  
 Germany: 069 86798021  
 Italy: 848 845 645  
 Spain: 901 516 645 Option  
 Switzerland: 0848 645 645  
 United Kingdom: 0870 900 4645

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