

Certified pH and Conductivity Standards

**COMPLETE
TRACEABILITY**



Radiometer Analytical certified pH and conductivity standards give you:

- total control of the traceability chain and calculated uncertainties,
- direct traceability to primary standards and the reference method,
- the competence and integrity of a laboratory internationally recognised to be accredited for the measurement of pH and conductivity reference materials.



Complete confidence

You can't afford to take chances with quality. You need to be sure that the solutions you use are certified and fully traceable to national standards. Only an officially accredited laboratory can give you complete confidence in your solutions. This accreditation is recognised in more than 35 countries. What greater assurance can you ask for?

Proof of the quality of your standards...

Accredited Calibration Laboratory

The use of standards manufactured by an accredited laboratory gives you complete confidence in the traceability chain and calculated uncertainties. Radiometer Analytical is part of the Hach Lange group and their Calibration Laboratory, located in Berlin, is accredited for the calibration of certified pH and conductivity standards by DKD, the German national accreditation authority. This accreditation (No. DKD-K-47901) is recognised in more than 35 countries. All standards are formulated in compliance with NIST, IUPAC and DIN19266 specifications⁽¹⁾.

IUPAC Series certified pH standards are fully traceable to the Standard Hydrogen Electrode through Certified Reference Material produced by the Primary Laboratory of either NIST or DFM⁽²⁾.

Radiometer Analytical certified conductivity standards are fully traceable to SI units via Certified Reference Materials manufactured by NIST. They are prepared and calibrated according to the internationally recognised demal scale laid down by the International Organisation of Legal Metrology (OIML – Recommendation No. 56).

A guaranteed value

the nominal value of the standard is guaranteed until first opening, even after several years' storage⁽³⁾.

A useful reference

a pH or conductivity temperature dependence table is printed on the bottle.

Safe storage

thanks to the airtight can.

GLP - right from the start

the date of opening can be marked directly on the bottle.

A

Proven traceability

each standard comes with its own Certificate of Conformity and Traceability.

Recommended shelf life

the observed typical shelf life after opening is printed on the bottle, ensuring timely use (2-3 months depending on the standards).



GLP - every day

the number of uses can be marked directly on the bottle in line with Good Laboratory Practice.

Accurate values

the nominal value and the tolerance of pH standards are given with a resolution of 3 significant decimals.

B

International accreditation

a DKD Calibration Certificate proves the traceability to national standards.

Foolproof calibration

each bottle of pH standard is supplied with 25 colour-coded beakers.

(1) Except pH7.000 formulated by us according to NIST, IUPAC and DIN19266 specifications of pH6.865 and pH7.413.

(2) Dansk Fundamental Metrologi A/S is accredited for pH measurements by the Danish Accreditation and Metrology Fund (DANAK) (no. 255).

(3) 4-year guarantee for pH standards (2 years for pH 12.45). 2-year guarantee for conductivity standards (1 year for the 25 µS/cm). The guarantee is valid from the date of the Certificate of Conformity and Traceability and only applies to standards kept unopened in the sealed can in compliance with the storage recommendations specified in the certificate.

(4) ISO Guide 31 provides guidelines for certified reference materials.

Glossary & useful links

NIST	National Institute of Standards and Technology www.nist.gov
IUPAC	International Union of Pure and Applied Chemistry www.iupac.org
DFM	Danish National Metrology Institute www.dfm.dtu.dk
DKD	Deutscher Kalibrierdienst www.dkd.eu
DANAK	Danish Accreditation and Metrology Fund www.danak.org
OIML	International Organisation of Legal Metrology www.oiml.org
ISO	International Organization for Standardization www.iso.org
USI	International System of Units www.bipm.fr/en/si
GLP	Good Laboratory Practice

...in writing

Each bottle of certified pH or conductivity standard manufactured by Radiometer Analytical is supplied with two certificates: a Certificate of Conformity and Traceability drawn up according to ISO Guide 31⁽⁴⁾ and a DKD Calibration Certificate. The back of the first certificate contains information about the composition and preparation of the standard as well as recommendations for storage and use to ensure optimum performance.

A

Certificate of Conformity and Traceability
Zertifikat über Konformität und Rückführbarkeit
Certificat de Conformité et de Traçabilité

Certified nominal value — pH 10.012 ± 0.010 (k=2) – 25°C

Batch number — Part No.: S11M007 Batch No.: C01311
Bestellnr.: S11M007 Chargennr.: C01311
Code: Lot n°:

Traceability: batch number of the NIST or DFM certified Reference Material — Traceability: Tracable to IUPAC/NIST pH scale. Certified reference material: Radiometer Medical A/S ampoule of pH standard, batch 159.48. Nominal value pH 10.012 at 25°C. The exact value of this standard was determined with an expanded uncertainty of ±0.0025 pH by Radiometer Medical A/S's accredited Primary Laboratory using a standard Hydrogen Electrode Apparatus. Samples from the batch are stored at Hach Lange GmbH for the warranty period of 4 years from the date of issue of the certificate.

Certified value giving limits of tolerance — **Certified value:** pH 10.012 ± 0.010 (k=2) at 25°C. The limits of the expanded uncertainty are given to guarantee a confidence level of ~95% (k=2). This uncertainty reflects the combined effects of measurement errors, variability among bottles and possible changes during storage in unopened tin.

Length of time for which the certified value is guaranteed — **Stability:** When stored in an unopened tin, the certified value is guaranteed for 4 years from the date of issue of the certificate.

Measurement and control procedures — **Homogeneity:** 7 bottles were selected for analytical control. Results from different bottles showed no statistically significant differences, nor was there any correlation between values obtained and the bottling sequence.

Date and signature of the Accredited Calibration Laboratory manager — **Measurement:** The certified value was determined by measurements of samples with dedicated electrodes under thermostated conditions using a high-resolution meter (0.0004 pH) traceable to electrical primary standards. Separate bottles were controlled for bacterial and mould contamination before the batch was released.

Signature / Unterschrift / Signature: [Signature]

F014K03H

B

DEUTSCHER KALIBRIERDIENST DKD
Calibration laboratory for electrochemical measuring quantities
Laboratoire d'étalonnage en mesure électrochimique
accredited by the / accrédité par la
Akkreditierungsstelle des DKD bei der
PHYSIKALISCH-TECHNISCHEN BUNDESANSTALT (PTB)

LANGES
HACH LANGE GmbH
D-14163 Berlin

DKD-K-47901
000005
DKD-K-47901
07-05

Calibration certificate
Certificat d'étalonnage

Object / Obj	pH calibration standard 10.012 Etalon pH 10,012	This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DKD is signatory to the multilateral agreements of the European Cooperation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have this object recalibrated at appropriate intervals. Le certificat d'étalonnage documente la traçabilité des grandeurs mesurées par rapportement aux étalons nationaux en conformité avec le Système International d'Unités (SI). Le DKD est signataire des accords multilatéraux de la European co-operation for Accreditation (EA) et de l'International Laboratory Accreditation Cooperation (ILAC) pour la reconnaissance mutuelle des certificats d'étalonnage. L'utilisateur est tenu de faire étalonner le matériel référencé ci-dessus à des intervalles appropriés.
Manufacturer / Fabricant	HACH LANGE GmbH D-14163 Berlin	
Nominal value / Valeur nominale	pH = 10.012 ± 0.010 @ 25°C	
Serial / Lot number / Numéro de série / Lot	C01311	
Manufactured for / Fabriqué pour	Radiometer Analytical SAS rte. des Aulx 99527 Villeurbanne Cedex, France	
Order / Part number / Numéro de commande / Partie	S11M007	
Number of copies of the certificate / Nombre de pages	2	
Date of calibration / Date d'étalonnage	23.05.2007	

Batch number — C01311

Calibration certificate number — 000005

Date and signature of the Accredited Calibration Laboratory manager — 23.05.2007
Dr. Holmfr. Simon Socino Kinner

Measuring procedure and conditions —

- Object / Obj: pH calibration standard / Etalon pH
- Calibration procedure / Procédure d'étalonnage: Method of calibration "QM1 ISO 17025 Anlage A4" / Différence de potentiel with a glass capillary electrode / Méthode d'étalonnage "QM1 ISO 17025 Anlage A4" / Différence de potentiel avec l'électrode en verre capillaire
- Calibration conditions / Conditions d'étalonnage: Calibration at 25°C with secondary pH reference material from Radiometer Medical Dansk, Certificate No. 119.164 / Etalonnage à 25°C avec le matériau de référence pH secondaire de Radiometer Medical Dansk, Certificat No. 119.164
- Calibration result / Résultat d'étalonnage: pH = 10.0126 @ 25°C
- Expanded Uncertainty / Incertitude élargie: pH = ± 0.0037 (k = 2)

Measured value and calculated expanded uncertainty —

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A comprehensive range

IUPAC Series certified pH standards

Type	Value*	Qty	Part No.
pH1.679	pH 1.679 ±0.010 at 25°C	500 ml	S11M001
pH4.005	pH 4.005 ±0.010 at 25°C	500 ml	S11M002
pH6.865	pH 6.865 ±0.010 at 25°C	500 ml	S11M003
pH7.000	pH 7.000 ±0.010 at 25°C	500 ml	S11M004
pH7.413	pH 7.413 ±0.010 at 25°C	500 ml	S11M005
pH9.180	pH 9.180 ±0.010 at 25°C	500 ml	S11M006
pH10.012	pH 10.012 ±0.010 at 25°C	500 ml	S11M007
pH12.45	pH 12.45 ±0.05 at 25°C	500 ml	S11M008

Certified conductivity standards

Type	Value*	Qty	Part No.
KCl 1 D	111.3 mS/cm ±0.5% at 25°C	500 ml	S51M001
KCl 0.1D	12.85 mS/cm ±0.35% at 25°C	500 ml	S51M002
KCl 0.01D	1408 µS/cm ±0.5% at 25°C	500 ml	S51M003
NaCl 0.05%	1015 µS/cm ±0.5% at 25°C	500 ml	S51M004
NaCl 25**	25.0 µS/cm ±5% at 25°C	250 ml	S51M013

* Tolerance.

** Supplied in a glass bottle.

Each standard is delivered in an airtight can and is supplied with a film-wrapped Certificate of Conformity and Traceability as well as a DKD Calibration Certificate specifying the exact measured value and calculated expanded uncertainty (k=2) for each batch of pH and conductivity solution.

Safety data sheets for all standards are available on request. Please contact your local distributor or download them directly from our web site.

Worldwide recognition

Accreditation by the German national accreditation body, DKD, is automatically international due to the mutual agreement made between the members of the European co-operation for Accreditation and bilateral agreements between specific countries. Signatories include the following:



 Australia	NATA	 Ireland	NAB	 Slovenia	SA
 Austria	BMWA	 Israel	ISRAC	 Slovakia	SNAS
 Belgium	BELAC	 Italy	SIT	 South Africa	SANAS
 Brazil	INMETRO	 Latvia	LATAK	 Spain	ENAC
 Czech Republic	CAI	 Lithuania	LA	 Sweden	SWEDAC
 Denmark	DANAK	 Netherlands	RvA	 Switzerland	SAS
 Estonia	EAK	 New Zealand	IANZ	 Turkey	TURKAK
 Finland	FINAS	 Norway	NA	 United Kingdom	UKAS
 France	COFRAC	 Poland	PCA	 United States	A2LA
 Greece	ESYD	 Portugal	IPAC		
 Hong Kong	HKAS	 Singapore	SAC-SINGLAS		