



MERCK

undisputed Accuracy for Your Quantitative Results

Diluted ready-to-use and
Certified Reference Materials for
Water and Wastewater Analysis

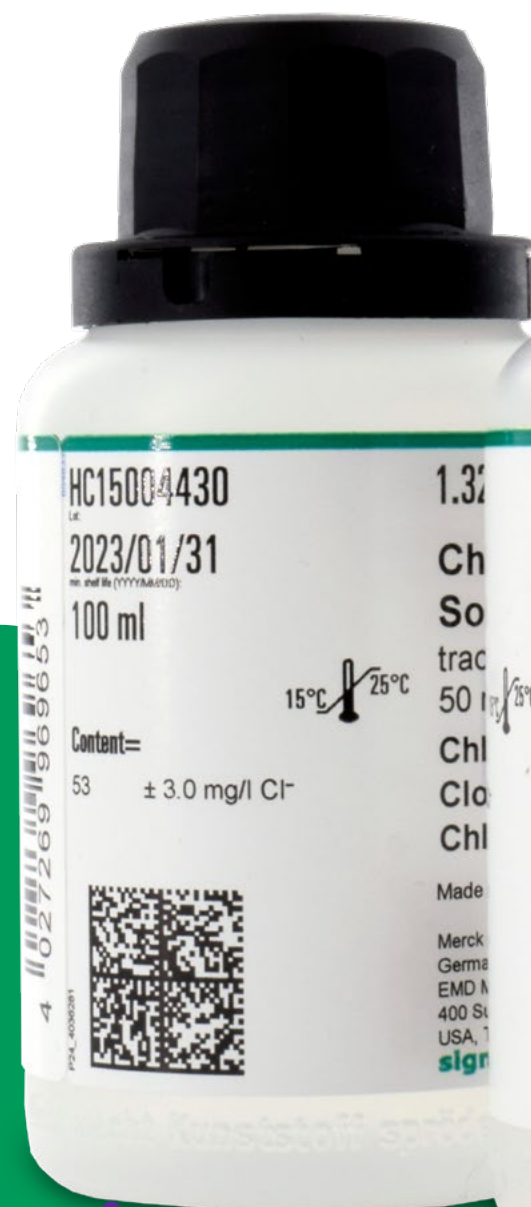
The Life Science business of Merck
operates as MilliporeSigma in the
U.S. and Canada.

Supelco®
Analytical Products

Diluted Reference Materials ready-to-use

Experience absolute precision with our ready-to-use diluted reference materials (RMs). Thanks to their exact concentrations, expanded measurement uncertainty, and direct traceability to NIST primary reference materials, our standard solutions ensure that your results are correct and comparable worldwide.

- **Precise Analytical Quality Control**
- **Directly Traceable to NIST**
- **No Dilution Needed**



Exact, batch-specific
concentration and expanded
measurement uncertainty



Complete range with all parameters for analytical quality control of wastewater, drinking water and process water

Detailed Certificate of Analysis for each RM simplifies accreditation

Compatible with Spectroquant® test kits or those from other suppliers

Ready-to-use, diluted RMs save time and prevent dilution errors

Long shelf life of 24 months

Directly traceable to NIST or USP primary measurement standards

Ideal for validating international norm methods: ISO, EN, APHA and EPA

Even better together

The perfect combination for water analysis: use our standard solutions with Spectroquant® Prove spectrophotometers.



Reference Materials, ready-to-use, for Photometry and other Applications

	Product	Concentration	Expanded Measurement Uncertainty	Composition	pH Range Solution	Method used for Uncertainty Measurement	Ord. No.
A	Aluminium Standard Solution	0.200 mg/L Al	± 0.006 mg/L Al	Al(NO ₃) ₃ in H ₂ O	3-5	ICP-OES	1.32225.0100
	Ammonium Standard Solution	0.250 mg/L NH ₄ ⁺	± 0.011 mg/L NH ₄ ⁺	NH ₄ Cl in H ₂ O	4-6	Photometry	1.32227.0100
	Ammonium Standard Solution	0.400 mg/L NH ₄ -N	± 0.012 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25022.0100
	Ammonium Standard Solution	1.00 mg/L NH ₄ -N	± 0.04 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25023.0100
	Ammonium Standard Solution	2.00 mg/L NH ₄ -N	± 0.07 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25024.0100
	Ammonium Standard Solution	6.00 mg/L NH ₄ -N	± 0.13 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25025.0100
	Ammonium Standard Solution	12.0 mg/L NH ₄ -N	± 0.4 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25026.0100
	Ammonium Standard Solution	50.0 mg/L NH ₄ -N	± 1.2 mg/L NH ₄ -N	NH ₄ Cl in H ₂ O	4-6	Photometry	1.25027.0100
	Arsenic Standard Solution ¹	1.00 mg/L As	± 0.05 mg/L As	H ₃ AsO ₄ in HNO ₃	2-3	ICP-OES	1.33002.0250
B	BOD Standard	198 mg/L BOD ₅	± 40 mg/L BOD ₅ *	Glucose-Glutamic acid based in H ₂ O	-	-	1.00718.0001
	Bromate Standard Solution	0.1000 mg/L BrO ₃ ⁻	± 0.0040 mg/L BrO ₃ ⁻	KBrO ₃ in H ₂ O	6-8	IC	1.33007.0100
C	Chloride Standard Solution	10.0 mg/L Cl ⁻	± 0.5 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1.32229.0100
	Chloride Standard Solution	50 mg/L Cl ⁻	± 3 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1.32230.0100
	Chloride Standard Solution	250 mg/L Cl ⁻	± 8 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1.32231.0100
	Chromium Standard Solution	0.050 mg/L Cr(VI)	± 0.002 mg/L Cr(VI)	K ₂ CrO ₄ in H ₂ O	6-8	ICP-OES	1.33012.0100
	Chromium Standard Solution	1.00 mg/L Cr(VI)	± 0.03 mg/L Cr(VI)	K ₂ CrO ₄ in H ₂ O	6-8	Photometry	1.33013.0100
	COD Standard Solution	20.0 mg/L COD	± 0.7 mg/L COD	KHP in H ₂ O	4-6	Photometry	1.25028.0100
	COD Standard Solution	100 mg/L COD	± 3 mg/L COD	KHP in H ₂ O	4-6	Photometry	1.25029.0100
	COD Standard Solution	200 mg/L COD	± 4 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25030.0100
	COD Standard Solution	400 mg/L COD	± 5 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25031.0100
	COD Standard Solution	1,000 mg/L COD	± 11 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25032.0100
	COD Standard Solution	2,000 mg/L COD	± 32 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25033.0100
	COD Standard Solution	8,000 mg/L COD	± 68 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25034.0100
	COD Standard Solution	50,000 mg/L COD	± 894 mg/L COD	KHP in H ₂ O	3-5	Photometry	1.25035.0100
F	Fluoride Standard Solution	0.200 mg/L F ⁻	± 0.012 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1.32234.0100
	Fluoride Standard Solution	0.50 mg/L F ⁻	± 0.02 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1.32233.0100
	Fluoride Standard Solution	1.00 mg/L F ⁻	± 0.03 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1.32235.0100
	Fluoride Standard Solution	1.50 mg/L F ⁻	± 0.04 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1.32236.0100
I	Iron Standard Solution	0.0500 mg/L Fe(III)	± 0.0015 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	ICP-OES	1.33014.0100
	Iron Standard Solution	0.1000 mg/L Fe(III)	± 0.0030 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	ICP-OES	1.33018.0100
	Iron Standard Solution	0.300 mg/L Fe(III)	± 0.009 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	Photometry	1.33019.0100
	Iron Standard Solution	1.00 mg/L Fe(III)	± 0.04 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	Photometry	1.33020.0100
L	Lead Standard Solution	0.100 mg/L Pb	± 0.005 mg/L Pb	Pb(NO ₃) ₂ in HNO ₃	3.5-4.5	ICP-OES	1.33004.0100
M	Manganese Standard Solution	0.050 mg/L Mn	± 0.004 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1.32237.0100
	Manganese Standard Solution	0.200 mg/L Mn	± 0.005 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1.32238.0100
	Manganese Standard Solution	1.00 mg/L Mn	± 0.03 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1.32239.0100
N	Nitrate Standard Solution	1.00 mg/L NO ₃ ⁻	± 0.03 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	IC	1.32240.0100
	Nitrate Standard Solution	10.0 mg/L NO ₃ ⁻	± 0.3 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	Photometry	1.32241.0100
	Nitrate Standard Solution	50.0 mg/L NO ₃ ⁻	± 2.0 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	Photometry	1.32242.0100
	Nitrate Standard Solution	0.50 mg/L NO ₃ -N	± 0.05 mg/L NO ₃ -N	NaNO ₃ in H ₂ O	5-7	Photometry	1.25036.0100
	Nitrate Standard Solution	2.50 mg/L NO ₃ -N	± 0.06 mg/L NO ₃ -N	NaNO ₃ in H ₂ O	5-7	Photometry	1.25037.0100
	Nitrate Standard Solution	15.0 mg/L NO ₃ -N	± 0.4 mg/L NO ₃ -N	NaNO ₃ in H ₂ O	5-7	Photometry	1.25038.0100
	Nitrate Standard Solution	40.0 mg/L NO ₃ -N	± 1.0 mg/L NO ₃ -N	NaNO ₃ in H ₂ O	5-7	Photometry	1.25039.0100
	Nitrate Standard Solution	200 mg/L NO ₃ -N	± 5 mg/L NO ₃ -N	NaNO ₃ in H ₂ O	5-7	Photometry	1.25040.0100
	Nitrite Standard Solution	0.200 mg/L NO ₂ -N	± 0.009 mg/L NO ₂ -N	NaNO ₂ in H ₂ O	5-7	Photometry	1.25041.0100
	Nitrite Standard Solution	40.0 mg/L NO ₂ -N	± 1.3 mg/L NO ₂ -N	NaNO ₂ in H ₂ O	5-7	Photometry	1.25042.0100
	Nitrogen (total) Standard Solution	2.50 mg/L N	± 0.06 mg/L N	Glycin in H ₂ O	5-7	Photometry	1.25043.0100
	Nitrogen (total) Standard Solution	12.0 mg/L N	± 0.3 mg/L N	Glycin in H ₂ O	5-7	Photometry	1.25044.0100
	Nitrogen (total) Standard Solution	100 mg/L N	± 3 mg/L N	Glycin in H ₂ O	5-7	Photometry	1.25045.0100

¹ 250 mL bottle

*tolerance analog to DIN EN ISO 5815-1, not measurement uncertainty

	Product	Concentration	Expanded Measurement Uncertainty	Composition	pH Range Solution	Method used for Uncertainty Measurement	Ord. No.
P	Phosphorus (total) Standard Solution	0.400 mg/L PO ₄ -P	± 0.016 mg/L PO ₄ -P	Turpinal SL in H ₂ O	4-6	Photometry	1.25046.0100
	Phosphorus (total) Standard Solution	4.00 mg/L PO ₄ -P	± 0.08 mg/L PO ₄ -P	Turpinal SL in H ₂ O	3-5	Photometry	1.25047.0100
	Phosphorus (total) Standard Solution	15.0 mg/L PO ₄ -P	± 0.4 mg/L PO ₄ -P	Turpinal SL in H ₂ O	2-4	Photometry	1.25048.0100
	Phosphorus (total) Standard Solution	75.0 mg/L PO ₄ -P	± 1.6 mg/L PO ₄ -P	Turpinal SL in H ₂ O	2-4	Photometry	1.25049.0100
S	Silicate Standard Solution	0.1000 mg/L SiO ₂	± 0.0040 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1.32244.0100
	Silicate Standard Solution	0.500 mg/L SiO ₂	± 0.025 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1.32243.0100
	Silicate Standard Solution	1.000 mg/L SiO ₂	± 0.030 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1.32245.0100
	Sulfate Standard Solution	40 mg/L SO ₄ ²⁻	± 6 mg/L SO ₄ ²⁻	Na ₂ SO ₄ in H ₂ O	4-6	Photometry	1.25050.0100
	Sulfate Standard Solution	125 mg/L SO ₄ ²⁻	± 6 mg/L SO ₄ ²⁻	Na ₂ SO ₄ in H ₂ O	4-6	Photometry	1.25051.0100
	Sulfate Standard Solution	400 mg/L SO ₄ ²⁻	± 20 mg/L SO ₄ ²⁻	Na ₂ SO ₄ in H ₂ O	4-6	Photometry	1.25052.0100
	Sulfate Standard Solution	800 mg/L SO ₄ ²⁻	± 27 mg/L SO ₄ ²⁻	Na ₂ SO ₄ in H ₂ O	4-6	Photometry	1.25053.0100
	Surfactants nonionic Standard Solution ²	1.00 mg/L Triton® X-100	± 0.16 mg/L Triton® X-100	Triton X-100® in H ₂ O	4-6	Photometry	1.33022.0100
T	Surfactants nonionic Standard Solution ²	5.00 mg/L Triton® X-100	± 0.30 mg/L Triton® X-100	Triton X-100® in H ₂ O	4-6	Photometry	1.33023.0100
	TOC Standard Solution	5.00 mg/L TOC	± 0.10 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1.32246.0100
	TOC Standard Solution	10.0 mg/L TOC	± 0.2 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1.32247.0100
	TOC Standard Solution	25.0 mg/L TOC	± 0.5 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1.32248.0100
	TOC Standard Solution	50.0 mg/L TOC	± 1.0 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1.32249.0100
	TOC Standard Solution	100 mg/L TOC	± 2 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1.32251.0100
	TOC Standard Solution	200 mg/L TOC	± 4 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1.32252.0100
	TOC Standard Solution	500 mg/L TOC	± 10 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1.32253.0100

² Traceable to USP

Free CoA

Certificates of Analysis (CoA) for all our standard solutions can be downloaded free of charge on:

SigmaAldrich.com/search


www.sigmaaldrich.com

Certificate of Analysis – Certified Reference Material
Certipur® Aluminium standard solution 1000 mg/l Al

Product no.: 1.19770.0100
Lot no.: HC28811270
Description of CRM: Aluminium standard solution 1000 mg/l Al
Expiry date: 2026/05/31
Storage: +15°C to +25°C tightly closed in the original container
Composition: Al(NO₃)₃ in HNO₃ 0.5 mol/l

Analyte	Certified value as mass fraction	Associated uncertainty, U=k·u (k=2) as mass fraction
Al	981 mg/kg	± 5 mg/kg

Metrological traceability: Directly traceable to NIST SRM 3101a, lot 140903
Measurement method: Inductively coupled plasma optical emission spectrometry ICP-OES
Intended use: This reference material is intended for use as a calibration standard in element analysis.
Instructions for handling and correct use: Shake well before use and never pipet directly from the original container. See Details for correct use on page 2.
Health and safety information: Please refer to the Safety Data Sheet for detailed information about the nature of any hazard and appropriate precautions to be taken.
Accreditation: Merck KGaA, Darmstadt, Germany is accredited by the German accreditation authority DAkkS as registered reference material producer D-RM-15185-01-00 in accordance with ISO 17034.
Certificate issue date: 2022/06/07




ISO 17034

CRM released by Approving Officer or delegate of Quality Control

Dipl.-Ing. Ayfer Yildirim
Responsible Laboratory Manager



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Certificate Page 1 of 2

Certificate version 01

Guideline for Calculating your Working Tolerance

According to ISO 17025, every lab needs to calculate its working tolerance.

Here are some hints for this procedure.

To help determine the individual measurement-uncertainty estimation, every laboratory that works according to the ISO 17025 standard should prepare a control chart for each reference material and for every lab operator. When it comes to defining the lab's working tolerance, the recommended procedure is to:

- Calculate the standard deviation of the measurements of the standard
- Define the lab's own error tolerances that are to be strived for

Here the user should consider the confidence interval that is usually used. Two-fold standard deviation yields a 95% confidence interval, and three-fold standard deviation a 99% confidence interval. The defined confidence interval should be marked on the control chart as the upper and lower limit.

The standard should be measured regularly, if not on a day-to-day basis. The instructions can be taken from the corresponding standards or the internal specifications. Wherever applicable, in the case that the method covers

a larger measuring range, two or more standards in the range of the normal results should also be determined.

In the Spectroquant® test kits, we state the accuracy of the respective method on the Certificate of Quality. This can be used to facilitate the estimation of the working tolerance. The working tolerance naturally also depends on the optical path length of the cells that are used.

The accuracy is calculated on the basis of the mean value of the 95% confidence interval of the respective test; this has been calculated over many years of experience along with the specified blank error. The blank error is stated in the batch certificate of each batch of the respective test kit for the reference cell.

These reference materials can be used to check all photometric methods (both standards and test kits). The reference materials can however, also be used for non-photometric methods. In this case, the user must perform their own measurement-uncertainty estimation. Guidelines or working tolerances of the type that we offer for our test kits are not available for other methods. The same applies for test kits supplied by other manufacturers.

Important Definitions for Reference Materials

Traceability

"Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty." *ISO Guide 99:2007; International Vocabulary of Metrology — Basic and General Concepts and Associated Terms (VIM)*

Reference Material (RM)

"Reference Material (RM) characterized by a metrologically valid procedure for one or more specified properties, accompanied by an RM certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability." *ISO/Guide 30:2015; Reference Materials — Selected Terms and Definitions*

Primary measurement standard

"Measurement standard that is designated or widely acknowledged as having the highest metrological qualities and whose property value is accepted without reference to other standards of the same property or quantity, within a specified context." *ISO/Guide 30:2015; Reference Materials — Selected Terms and Definitions*

Secondary measurement standard

"Measurement standard whose property value is assigned by comparison with a primary measurement standard of the same property or quantity." *ISO/Guide 30:2015; Reference Materials — Selected Terms and Definitions*

Measurement uncertainty

Non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used. *ISO Guide 99:2007; International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)*

Expanded measurement uncertainty

Product of a combined standard measurement uncertainty and a factor larger than the number one NOTE: The term "factor" in this definition refers to a coverage factor. *ISO Guide 99:2007; International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (VIM)*

Conversion tables

Ammonium				
	mg/L (ppm) NH ₄ -N	mg/L (ppm) NH ₄	mg/L (ppm) NH ₃ -N	mg/L (ppm) NH ₃
1 mg/L (ppm) NH ₄ -N	1.00000	1.28784	1.00000	1.21429
1 mg/L (ppm) NH ₄	0.77649	1.00000	0.77649	0.94413
1 mg/L (ppm) NH ₃ -N	1.00000	1.28784	1.00000	1.21429
1 mg/L (ppm) NH ₃	0.82245	1.05918	0.82245	1.00000
Chromate				
	mg/L (ppm) Cr		mg/L (ppm) CrO ₄	
1 mg/L (ppm) Cr	1.000000		2.23082	
1 mg/L (ppm) CrO ₄	0.448265		1.00000	
Nitrate				
	mg/L (ppm) NO ₃ -N		mg/L (ppm) NO ₃	
1 mg/L (ppm) NO ₃ -N	1.000000		4.42681	
1 mg/L (ppm) NO ₃	0.225896		1.00000	
Nitrite				
	mg/L (ppm) NO ₂ -N		mg/L (ppm) NO ₂	
1 mg/L (ppm) NO ₂ -N	1.000000		3.28457	
1 mg/L (ppm) NO ₂	0.304453		1.00000	
Phosphate				
	mg/L (ppm) PO ₄ -P	mg/L (ppm) PO ₄	mg/L (ppm) P ₂ O ₅	
1 mg/L (ppm) PO ₄ -P	1.00000	3.06617	2.29137	
1 mg/L (ppm) PO ₄	0.326139	1.00000	0.747307	
1 mg/L (ppm) P ₂ O ₅	0.436419	1.33813	1.00000	
Silicate				
	mg/L (ppm) Si		mg/L (ppm) SiO ₂	
1 mg/L (ppm) Si	1.000000		2.13932	
1 mg/L (ppm) SiO ₂	0.467437		1.00000	



Photometric, ready-to-use, multi-parameter standards and spiking solutions - Spectroquant® CombiCheck

CombiCheck contains multi-parameter standard solutions for checking the overall system – from test kits and instruments to individual working procedures. Each pack contains one standard solution and one addition solution, both of which are directly traceable to NIST primary standards.

When the specified concentration of the standard solution is found, the entire analysis system is in order. If there are deviations from the stated value, use the addition solution to identify errors due to interfering substances in the sample matrix. In case the recovery rate is insufficient (beyond specified tolerances), analyze and eliminate the cause through appropriate countermeasures, such as sample pre-treatment.



Spectroquant® CombiCheck 10					Ord. No. 1.14676.0001
Parameter	Concentration	and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks
Ammonium	4.00	±0.30 mg/L NH ₄ -N	1.14558.0001	1.0	96
Chloride	25	±6 mg/L Cl ⁻	1.14730.0001	1.0	96
COD	80	±12 mg/L COD	1.14540.0001	3.0	32
	80	±12 mg/L COD	1.18751.0001	2.0	48
Nitrate	2.50	±0.40 mg/L NO ₃ -N	1.14556.0001	2.0	48
	2.50	±0.40 mg/L NO ₃ -N	1.14773.0001 ²	1.5	64
	2.50	±0.40 mg/L NO ₃ -N	1.09713.0001 ³	1.0	96
Phosphate ⁴	0.80	±0.08 mg/L PO ₄ -P	1.00474.0001	5.0	19
	0.80	±0.08 mg/L PO ₄ -P	1.14543.0001	5.0	19
	0.80	±0.08 mg/L PO ₄ -P	1.14848.0001/ .0002 ²	5.0	19
	0.80	±0.08 mg/L PO ₄ -P	1.14848.0002 ³	10.0	9
Sulfate	100	±15 mg/L SO ₄ ²⁻	1.14548.0001	5.0	19
	100	±15 mg/L SO ₄ ²⁻	1.00617.0001	2.0	48
	100	±15 mg/L SO ₄ ²⁻	1.02537.0001	5.0	19
Ammonium	3.00	±0.25 mg/L NH ₄ -N	1.14558.0001	0.10	280
Chloride	25	±6 mg/L Cl ⁻	1.14730.0001	0.10	280
COD	30	±8 mg/L COD	1.14540.0001	0.10	280
	45	±8 mg/L COD	1.18751.0001	0.10	280
Nitrate	1.50	±0.20 mg/L NO ₃ -N	1.14556.0001	0.10	280
	2.00	±0.40 mg/L NO ₃ -N	1.14773.0001 ²	0.10	280
	3.00	±0.50 mg/L NO ₃ -N	1.09713.0001 ³	0.10	280
Phosphate ⁴	6.0	±1.0 mg/L NO ₃ -N	1.09713.0001 ^{1,2}	0.10	280
	0.60	±0.07 mg/L PO ₄ -P	1.00474.0001	0.10	280
	0.60	±0.07 mg/L PO ₄ -P	1.14543.0001	0.10	280
	0.30	±0.05 mg/L PO ₄ -P	1.14848.0001/ .0002 ³	0.10	280
Sulfate	40	±5 mg/L SO ₄ ²⁻	1.14548.0001	0.10	280
	100	±15 mg/L SO ₄ ²⁻	1.00617.0001	0.10	280
	40	±5 mg/L SO ₄ ²⁻	1.02537.0001	0.10	280

**Standard Solution
Reagent R-1**

**Addition Solution
Reagent R-2**
(for spiking of samples)

¹ Using a 10 mm rectangular cell, Ord. No. 1.14946.0001

² Using a 20 mm rectangular cell, Ord. No. 1.14947.0001

³ Using a 50 mm rectangular cell, Ord. No. 1.14944.0001

⁴ Only the determination of ortho-phosphate can be checked

⁵ Please check the availability of the test kits

Spectroquant® CombiCheck 20					Ord. No. 1.14675.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution	Number of quality checks	
Ammonium	12.0 ±1.0 mg/L NH ₄ -N	1.14544.0001	0.50	192	Standard Solution Reagent R-1
Chloride	60 ±10 mg/L Cl ⁻	1.14730.0001	1.0	96	
COD	750 ±75 mg/L COD	1.14541.0001	3.0	32	
	750 ±75 mg/L COD	1.18752.0001	2.0	48	
Nitrate	9.0 ±0.9 mg/L NO ₃ -N	1.14563.0001	1.0	96	
	9.0 ±0.9 mg/L NO ₃ -N	1.14542.0001	1.5	64	
	9.0 ±0.9 mg/L NO ₃ -N	1.09713.0001/ .0002 ¹	0.50	192	
	9.0 ±0.9 mg/L NO ₃ -N	1.14773.0001 ¹	1.5	64	
	9.0 ±0.9 mg/L NO ₃ -N	1.14942.0001	1.0	96	
Phosphate ⁴	8.0 ±0.7 mg/L PO ₄ -P	1.00475.0001	1.0	96	
	8.0 ±0.7 mg/L PO ₄ -P	1.14729.0001	1.0	96	
Sulfate	500 ±75 mg/L SO ₄ ²⁻	1.14564.0001	1.0	96	Addition Solution Reagent R-2 (for spiking of samples)
Ammonium	8.0 ±0.8 mg/L NH ₄ -N	1.14544.0001	0.10	280	
Chloride	40 ±7 mg/L Cl ⁻	1.14730.0001	0.10	280	
COD	200 ±40 mg/L COD	1.14541.0001	0.10	280	
	300 ±40 mg/L COD	1.18752.0001	0.10	280	
Nitrate	7.5 ±0.8 mg/L NO ₃ -N	1.14563.0001	0.10	280	
	5.0 ±0.6 mg/L NO ₃ -N	1.14542.0001	0.10	280	
	15.0 ±1.5 mg/L NO ₃ -N	1.09713.0001/ .0002	0.10	280	
	5.0 ±0.6 mg/L NO ₃ -N	1.14773.0001 ¹	0.10	280	
	7.5 ±0.8 mg/L NO ₃ -N	1.14942.0001 ¹	0.10	280	
Phosphate ⁴	5.0 ±0.5 mg/L PO ₄ -P	1.00475.0001	0.10	280	
	5.0 ±0.5 mg/L PO ₄ -P	1.14729.0001	0.10	280	
Sulfate	150 ±30 mg/L SO ₄ ²⁻	1.14564.0001	0.10	280	

Spectroquant® CombiCheck 50					Ord. No. 1.14695.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	
Ammonium	1.000 ±0.100 mg/L NH ₄ -N	1.14739.0001	5.0	19	Standard Solution Reagent R-1
	1.00 ±0.10 mg/L NH ₄ -N	1.14752.0002/ .0001 ¹	5.0	19	
COD	20.0 ±4.0 mg/L COD	1.14560.0001	3.0	32	
	20.0 ±4.0 mg/L COD	1.01796.0001	2.0	48	
	20.0 ±4.0 mg/L COD	1.18750.0001	2.0	48	
Nitrogen	5.0 ±0.7 mg/L N	1.00613.0001	0.10	9	Addition Solution Reagent R-2 (for spiking of samples)
	5.0 ±0.7 mg/L N	1.14537.0001	0.10	9	
Ammonium	1.000 ±0.100 mg/L NH ₄ -N	1.14739.0001	0.10	280	
	1.00 ±0.10 mg/L NH ₄ -N	1.14752.0002/ .0001 ¹	0.10	280	
COD	10.0 ±3.0 mg/L COD	1.14560.0001	0.10	280	
	15.0 ±3.0 mg/L COD	1.01796.0001	0.10	280	
	15.0 ±3.0 mg/L COD	1.18750.0001	0.10	280	
Nitrogen	3.0 ±0.5 mg/L N	1.00613.0001	0.10	280	
	3.0 ±0.5 mg/L N	1.14537.0001	0.10	280	

¹ Using a 10 mm rectangular cell, Ord. No. 1.14946.0001

² Using a 20 mm rectangular cell, Ord. No. 1.14947.0001

³ Using a 50 mm rectangular cell, Ord. No. 1.14944.0001

⁴ Only the determination of ortho-phosphate can be checked

⁵ Please check the availability of the test kits

Spectroquant® CombiCheck

Analytical Quality Assurance

Spectroquant® CombiCheck 60					Ord. No. 1.14696.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
Chloride	125 ±13 mg/L Cl ⁻	1.14897.0001/ .0002	1.0	96	
COD	250 ±25 mg/L COD	1.14690.0001	2.0	48	
	250 ±20 mg/L COD	1.14895.0001	2.0	48	
Chloride	50 ±7 mg/L Cl ⁻	1.14897.0001/ .0002	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
COD	75 ±15 mg/L COD	1.14690.0001	0.10	280	
	75 ±10 mg/L COD	1.14895.0001	0.10	280	

Spectroquant® CombiCheck 70					Ord. No. 1.14689.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
Ammonium	50.0 ±5.0 mg/L NH ₄ -N	1.14559.0001	0.10	960	
Ammonium (2.0 – 75.0 mg/L)	50.0 ±5.0 mg/L NH ₄ -N	1.00683.0001 ¹	0.20	480	
Ammonium (5 – 150 mg/L)	50.0 ±5 mg/L NH ₄ -N	1.00683.0001 ¹	0.10	960	
COD	5,000 ±400 mg/L COD	1.14555.0001	1.0	96	
	5,000 ±400 mg/L COD	1.18753.0001	0.20	480	
Nitrogen	50 ±7 mg/L N	1.14763.0001	1.0	96	
Ammonium	20.0 ±2.0 mg/L NH ₄ -N	1.14559.0001	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
Ammonium (2.0 – 75.0 mg/L)	10.0 ±1.0 mg/L NH ₄ -N	1.00683.0001 ¹	0.10	280	
Ammonium (5 – 150 mg/L)	20.0 ±2 mg/L NH ₄ -N	1.00683.0001 ¹	0.10	280	
COD	2,000 ±200 mg/L COD	1.14555.0001	0.10	280	
Nitrogen	20.0 ±6 mg/L N	1.14763.0001	0.10	280	

Spectroquant® CombiCheck 80					Ord. No. 1.14738.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
COD	1,500 ±150 mg/L COD	1.14691.0001	2.0	48	
Nitrate	25.0 ±2.5 mg/L NO ₃ -N	1.14764.0001	0.50	190	
Phosphate ⁴	15.0 ±1.0 mg/L PO ₄ -P	1.00475.0001	1.0	96	
	15.0 ±1.0 mg/L PO ₄ -P	1.14729.0001	1.0	96	
COD	1,000 ±100 mg/L COD	1.14691.0001	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
Nitrate	10.0 ±1.5 mg/L NO ₃ -N	1.14764.0001	0.10	280	
Phosphate ⁴	5.0 ±0.5 mg/L PO ₄ -P	1.00475.0001	0.10	280	
	5.0 ±0.5 mg/L PO ₄ -P	1.14729.0001	0.10	280	

¹ Using a 10 mm rectangular cell, Ord. No. 1.14946.0001

² Using a 20 mm rectangular cell, Ord. No. 1.14947.0001

³ Using a 50 mm rectangular cell, Ord. No. 1.14944.0001

⁴ Only the determination of ortho-phosphate can be checked

⁵ Please check the availability of the test kits

NEW

The CombiCheck 90
is replacing the
CombiCheck 30

Spectroquant® CombiCheck 90					Ord. No. 1.18700.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	
Cadmium	0.250 ±0.030 mg/L Cd	1.01745.0001 ¹	10.0	9	Standard Solution Reagent R-1
	0.250 ±0.030 mg/L Cd	1.14834.0001	5.0	19	
Iron	1.00 ±0.15 mg/L Fe	1.14549.0001	5.0	19	
	1.00 ±0.15 mg/L Fe	1.14761.0001 ¹	5.0	19	
	1.00 ±0.15 mg/L Fe	1.00796.0001 ¹	8.0	12	
Copper	2.00 ±0.20 mg/L Cu	1.14553.0001	5.0	19	
	2.00 ±0.20 mg/L Cu	1.14767.0001 ¹	5.0	19	
Manganese	1.00 ±0.15 mg/L Mn	1.00816.0001	7.0	13	
	1.00 ±0.15 mg/L Mn	1.14770.0001 ³	10.0	9	
	1.00 ±0.15 mg/L Mn	1.01846.0001 ¹	8.0	12	
Cadmium	0.100 ±0.015 mg/L Cd	1.01745.0001 ¹	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
	0.200 ±0.030 mg/L Cd	1.14834.0001	0.10	280	
Iron	3.00 ±0.30 mg/L Fe	1.14549.0001	0.10	280	
	3.00 ±0.30 mg/L Fe	1.14761.0001 ¹	0.10	280	
	1.88 ±0.20 mg/L Fe	1.00796.0001 ¹	0.10	280	
Copper	3.00 ±0.30 mg/L Cu	1.14553.0001	0.10	280	
	3.00 ±0.30 mg/L Cu	1.14767.0001 ¹	0.10	280	
Manganese	1.43 ±0.15 mg/L Mn	1.00816.0001	0.10	280	
	1.00 ±0.15 mg/L Mn	1.14770.0001 ³	0.10	280	
	1.25 ±0.15 mg/L Mn	1.01846.0001 ¹	0.10	280	

NEW

The CombiCheck 100 is
replacing the
CombiCheck 40

Spectroquant® CombiCheck 100					Ord. No. 1.18701.0001
Parameter	Concentration and working tolerance	Can be used for test kits Ord. No. ⁵	Standard solution [mL]	Number of quality checks	
Aluminium	0.40 ±0.05 mg/L Al	1.00594.0001	6.0	16	Standard Solution Reagent R-1
	0.40 ±0.05 mg/L Al	1.14825.0001 ¹	5.0	19	
Lead	2.00 ±0.20 mg/L Pb	1.14833.0001	5.0	19	
	2.00 ±0.20 mg/L Pb	1.09717.0001 ¹	8.0	11	
Nickel	2.00 ±0.20 mg/L Ni	1.14554.0001	5.0	19	
	2.00 ±0.20 mg/L Ni	1.14785.0001 ¹	5.0	19	
Zinc	0.750 ±0.150 mg/L Zn	1.00861.0001	10.0	9	Addition Solution Reagent R-2 (for spiking of samples)
	0.75 ±0.15 mg/L Zn	1.14832.0001	5.0	19	
Aluminium	0.20 ±0.03 mg/L Al	1.00594.0001	0.10	280	
	0.24 ±0.04 mg/L Al	1.14825.0001 ¹	0.10	280	
Lead	1.00 ±0.15 mg/L Pb	1.14833.0001	0.10	280	
	0.63 ±0.10 mg/L Pb	1.09717.0001 ¹	0.10	280	
Nickel	2.00 ±0.20 mg/L Ni	1.14554.0001	0.10	280	
	2.00 ±0.20 mg/L Ni	1.14785.0001 ¹	0.10	280	
Zinc	0.250 ±0.050 mg/L Zn	1.00861.0001	0.10	280	
	0.50 ±0.05 mg/L Zn	1.14832.0001	0.10	280	

¹ Using a 10 mm rectangular cell, Ord. No. 1.14946.0001

² Using a 20 mm rectangular cell, Ord. No. 1.14947.0001

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Certipur® and TraceCERT® Certified Reference Material Standard Solutions

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Ion chromatography standards

Certipur®	TraceCERT®
Anionic and cationic solutions	
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Unique level of accuracy and lot-specific value	
Produced according to ISO 17034	
Traceable to SI-units via primary reference standards from NIST	
Sophisticated packaging* and comprehensive documentation including proper uncertainty calculation, expiry date and storage information	

ICP/AAS spectroscopy standards

Certipur®	TraceCERT®
Concentration: 1, 10, 1000, 10000 mg/L	
Unique level of accuracy and lot-specific value	
Produced according to ISO 17034	
Traceable to SI-units via primary reference standards from NIST or BAM	
Sophisticated packaging* and comprehensive documentation including proper uncertainty calculation, expiry date and storage information	

*All standards are supplied in HDPE bottles except for the TraceCERT® Mercury solution, which is bottled in a 100-ml borosilicate white glass bottle.

Batch-specific certificates are available via
SigmaAldrich.com

Parameter	Matrix	Pack size	Certipur® Order no	Pack size	TraceCERT® Order no
Aluminium	HNO ₃	100 mL	1.19770.0100	100 mL	61935
Ammonium	H ₂ O	500 mL	1.04622.0500	100 mL	59755
Antimony	HNO ₃	100 mL	1.70204.0100	100 mL	73495
Arsenic	HNO ₃	100 mL	1.19773.0100	100 mL	72718
				100 mL	76686
Barium	HNO ₃	100 mL	1.19774.0100	250 mL	90092
Boron	H ₂ O	100 mL	1.19500.0100	100 mL	01392
Bromide	H ₂ O	100 mL	1.04702.0500	100 mL	43147
Cadmium	HNO ₃	100 mL	1.19777.0100	100 mL	36379
Calcium	HNO ₃	100 mL	1.19778.0100	100 mL	19051
Chloride	H ₂ O	500 mL	1.04618.0500	100 mL	39883
Chromate	H ₂ O	500 mL	1.04703.0500	100 mL	68131
				100 mL	40121
Chromium (III)	HNO ₃	100 mL	1.19779.0100	100 mL	74582
Cobalt	HNO ₃	100 mL	1.19785.0100	100 mL	30329
Copper	HNO ₃	100 mL	1.19786.0100	100 mL	68921
Cyanide	H ₂ O	500 mL	1.04695.0500	100 mL	90157
Fluoride	H ₂ O	500 mL	1.04688.0500	100 mL	77365
Gold	HCl	100 mL	1.70216.0100	100 mL	38168
Iron	HNO ₃	100 mL	1.19781.0100	100 mL	43149
Lead	HNO ₃	100 mL	1.19776.0100	100 mL	41318
Magnesium	HNO ₃	100 mL	1.19788.0100	100 mL	30083
Manganese	HNO ₃	100 mL	1.19789.0100	100 mL	74128
Mercury	HNO ₃	100 mL	1.70226.0100	100 mL	28941
Molybdenum	H ₂ O	100 mL	1.70227.0100	100 mL	68780
Nickel	HNO ₃	100 mL	1.70336.0100	100 mL	28944
Nitrate	H ₂ O	500 mL	1.04613.0500	100 mL	74246
Nitrite	H ₂ O	500 mL	1.04659.0500	100 mL	67276
Palladium	HNO ₃	100 mL	1.14282.0100	100 mL	77091
Phosphate	H ₂ O	500 mL	1.04690.0500	100 mL	38364
Platinum	HCl	100 mL	1.70219.0100	100 mL	19078
Potassium	HNO ₃	100 mL	1.70342.0100	100 mL	06335
Silicon	HNO ₃	100 mL	1.70236.0100	100 mL	08729
	NaOH	100 mL	1.70365.0100	100 mL	15747
Silver	HNO ₃	100 mL	1.19797.0100	100 mL	12818
Sodium	H ₂ O	500 mL	1.04711.0500	100 mL	43492
Sulfate	H ₂ O	500 mL	1.04694.0500	100 mL	90071
Tin	HCl	100 mL	1.70242.0100	100 mL	92615
TOC	H ₂ O	100 mL	1.09017.0100		
Vanadium	HNO ₃	100 mL	1.70245.0100	100 mL	18399
Zinc	HNO ₃	100 mL	1.19806.0100	100 mL	18562

1) analytical standard, not CRM

Analytical Instrument Qualification of Photometric Equipment

UV/Vis Standards

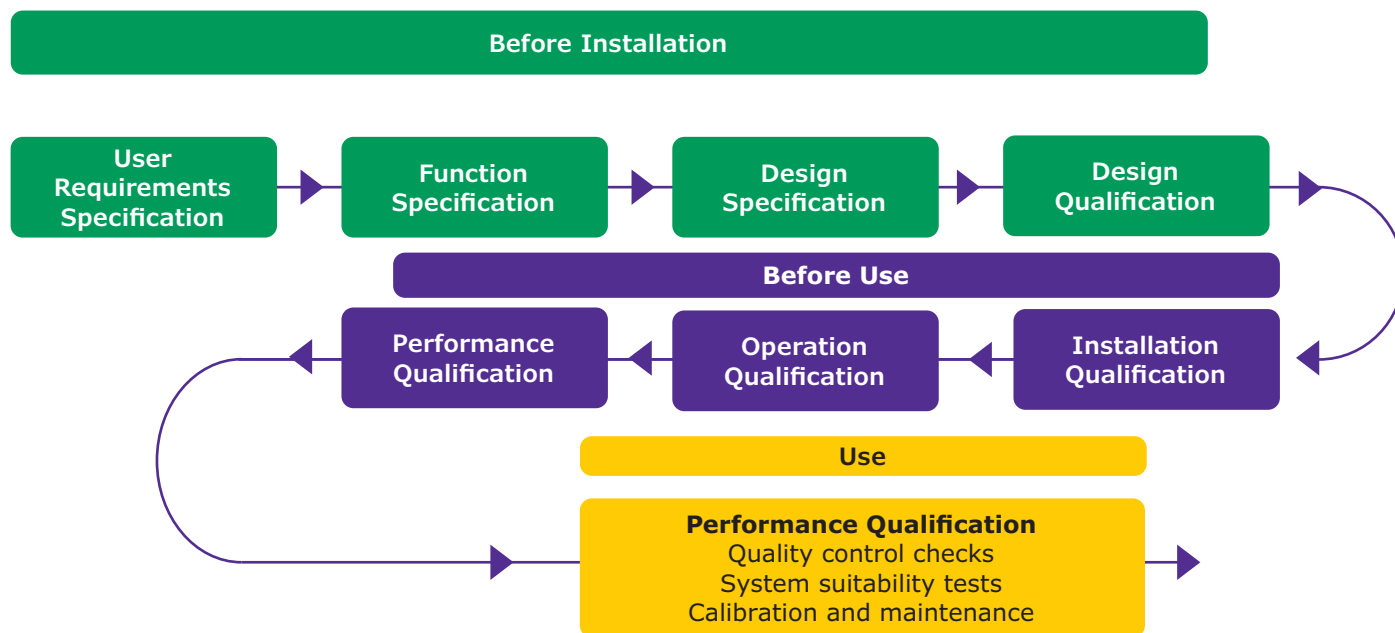
Using our Certipur® line of UV/Vis standards, the consistent and correct function of your UV/Vis spectrophotometer can be detected throughout the whole timeline of analytical Instrument Qualification (AIQ).

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.

See the following table for an overview about our UV/Vis solutions application possibilities and features

Certipur® Reference Solutions	
Features	Manufactured acc. to Ph.Eur.
	Ready-to-use solutions
	Packaged in amber glass ampoules for increased stability
Parameters detected	• Absorbance • Stray light • Spectral resolution • Wavelength accuracy

Qualification Processes



Product	Description	Order No
UV-VIS Standard 1 solution, according to Ph.Eur. (absorbance)	2x10 mL $K_2Cr_2O_7$ 60.06 mg/L in H_2SO_4 / 0.01N and 6x10 mL H_2SO_4 / 0.01N	1.08160.0001
UV-VIS Standard 1a: Potassium dichromate solution (600mg/l), according to Ph.Eur. absorbance at 430 nm	2x10 mL $K_2Cr_2O_7$ 606.6 mg/L in H_2SO_4 / 0.01N and 6x10 mL H_2SO_4 / 0.01N	1.04660.0001
UV-VIS Standard 2: Sodium nitrite solution according to Ph.Eur. stray light testing	3x10 mL $NaNO_2$ 50 g/L in H_2O	1.08161.0001
UV-VIS Standard 3: Sodium iodide solution according to Ph.Eur. stray light testing	3x10 mL NaI 10 g/L in H_2O	1.08163.0001
UV-VIS Standard 4: Potassium chloride solution according to Ph.Eur. stray light testing	3x10 mL KCl 12 g/L in H_2O	1.08164.0001
UV-VIS Standard 5: Toluene solution in n-hexane according to Ph.Eur. resolution power testing	2x10 mL 0.02% (v/v) toluene in n-hexane and 6x10 mL n-hexane	1.08165.0001
UV-VIS Standard 6: Holmium oxide solution according to Ph.Eur. for wavelength accuracy	3x10 mL Ho_2O_3 40 g/L in $HClO_4$ (10% v/v)	1.08166.0001



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