



**MILLIPORE
SIGMA**

Undisputed Accuracy for Your Quantitative Results

Diluted ready-to-use and
Certified Reference Materials for
water and wastewater analysis

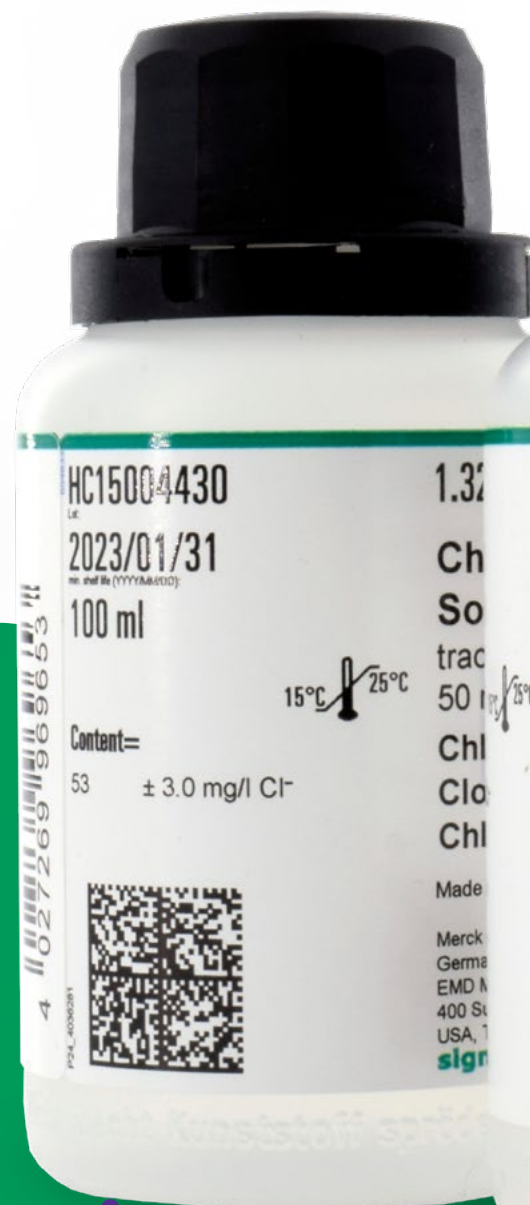
MilliporeSigma is the U.S. and
Canada Life Science business of
Merck KGaA, Darmstadt, Germany.

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

Even better together

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



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



1.32230.0100

Supelco

Chloride Standard Solution

traceable to SRM from NIST
50 mg/l Cl⁻ in H₂O

Chlorid-Standardlösung
Cloruro - solución patrón
Chlorure solution étalon

Made in Germany

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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
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

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.
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	
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
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	
T	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](https://www.sigmaaldrich.com/search)

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 ⁻	1.14730.0007	1.0	96	
COD	80 ±12 mg/L COD	1.14540.0007	3.0	32	
	80 ±12 mg/L COD	1.18751.0007	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	Standard Solution Reagent R-1
Phosphate ⁴	0.80 ±0.08 mg/L PO ₄ -P	1.00474.0007	5.0	19	
	0.80 ±0.08 mg/L PO ₄ -P	1.14543.0007	5.0	19	
	0.80 ±0.08 mg/L PO ₄ -P	1.14848.0007/ .0008 ²	5.0	19	
	0.80 ±0.08 mg/L PO ₄ -P	1.14848.0008 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⁻	1.14791.0001	2.5	38	
	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 ⁻	1.14730.0007	0.10	280	
COD	30 ±8 mg/L COD	1.14540.0007	0.10	280	
	45 ±8 mg/L COD	1.18751.0007	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	
	6.0 ±1.0 mg/L NO ₃ -N	1.09713.0001 ^{1,2}	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
Phosphate ⁴	0.60 ±0.07 mg/L PO ₄ -P	1.00474.0007	0.10	280	
	0.60 ±0.07 mg/L PO ₄ -P	1.14543.0007	0.10	280	
	0.30 ±0.05 mg/L PO ₄ -P	1.14848.0007/ .0008 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	
	80 ±10 mg/L SO ₄ ²⁻	1.14791.0001 ¹	0.10	280	
	40 ±5 mg/L SO ₄ ²⁻	1.02537.0001	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 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	
Chloride	60 ±10 mg/L Cl ⁻	1.14730.0007	1.0	96	
COD	750 ±75 mg/L COD	1.14541.0007	3.0	32	
	750 ±75 mg/L COD	1.18752.0007	2.0	48	
Nitrate	9.0 ±0.9 mg/L NO ₃ -N	1.14563.0001	1.0	96	Standard Solution Reagent R-1
	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	1.00475.0007	1.0	96	
	8.0 ±0.7 mg/L PO ₄ -P	1.14729.0007	1.0	96	
Sulfate	500 ±75 mg/L SO ₄ ²⁻	1.14564.0001	1.0	96	
<hr/>					
Ammonium	8.0 ±0.8 mg/L NH ₄ -N	1.14544.0001	0.10	280	
Chloride	40 ±7 mg/L Cl ⁻	1.14730.0007	0.10	280	
COD	200 ±40 mg/L COD	1.14541.0007	0.10	280	
	300 ±40 mg/L COD	1.18752.0007	0.10	280	
Nitrate	7.5 ±0.8 mg/L NO ₃ -N	1.14563.0001	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
	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	1.00475.0007	0.10	280	
	5.0 ±0.5 mg/L PO ₄ -P	1.14729.0007	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	
	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	1.14560.0007	3.0	32	Standard Solution Reagent R-1
	20.0 ±4.0 mg/L COD	1.01796.0007	2.0	48	
	20.0 ±4.0 mg/L COD	1.18750.0007	2.0	48	
Nitrogen	5.0 ±0.7 mg/L N	1.00613.0001	10	9	
	5.0 ±0.7 mg/L N	1.14537.0001	10	9	
<hr/>					
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	1.14560.0007	0.10	280	Addition Solution Reagent R-2 (for spiking of samples)
	15.0 ±3.0 mg/L COD	1.01796.0007	0.10	280	
	15.0 ±3.0 mg/L COD	1.18750.0007	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	
Chloride	125 ±13 mg/L Cl ⁻	1.14897.0007/ .0008	1.0	96	Standard Solution Reagent R-1
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 ⁻	1.14897.0007/ .0008	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	
Ammonium	50.0 ±5.0 mg/L NH ₄ -N	1.14559.0001	0.10	960	Standard Solution Reagent R-1
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	1.14555.0007	1.0	96	
	5,000 ±400 mg/L COD	1.18753.0007	0.20	480	
Nitrogen	50 ±7 mg/L N	1.14763.0001	1.0	96	Addition Solution Reagent R-2 (for spiking of samples)
Ammonium	20.0 ±2.0 mg/L NH ₄ -N	1.14559.0001	0.10	280	
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	1.14555.0007	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	
COD	1,500 ±150 mg/L COD	1.14691.0007	2.0	48	Standard Solution Reagent R-1
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	1.00475.0007	1.0	96	
	15.0 ±1.0 mg/L PO ₄ -P	1.14729.0007	1.0	96	
COD	1,000 ±100 mg/L COD	1.14691.0007	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	1.00475.0007	0.10	280	
	5.0 ±0.5 mg/L PO ₄ -P	1.14729.0007	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	1.00796.0007 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	1.00816.0007	7.0	13		
	1.00 ±0.15 mg/L Mn	1.14770.0007 ³	10.0	9		
	1.00 ±0.15 mg/L Mn	1.01846.0007 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	1.00796.0007 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	1.00816.0007	0.10	280		
	1.00 ±0.15 mg/L Mn	1.14770.0007 ³	0.10	280		
	1.25 ±0.15 mg/L Mn	1.01846.0007 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	1.14785.0007 ¹	5.0	19		
Zinc	0.750 ±0.150 mg/L Zn	1.00861.0007	10.0	9		
	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		Addition Solution Reagent R-2 (for spiking of samples)
	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	1.14785.0007 ¹	0.10	280		
Zinc	0.250 ±0.050 mg/L Zn	1.00861.0007	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
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

Certipur® and TraceCERT® Certified Reference Material Standard Solutions

If you need to make your own dilute solutions according to your lab-specific concentrations, rely on the superb quality of our Certipur® and TraceCERT® Certified Reference Material Standard Solutions.



Ion chromatography standards

Certipur®	TraceCERT®
Anionic and cationic solutions	Anionic and cationic solutions
Concentrations: 1000 mg/L	
Unique level of accuracy and lot-specific value	
(ISO 17034 accreditation in preparation)	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	
* All standards are supplied in HDPE bottles except for the TraceCERT® Mercury solution, which is bottled in 100 mL borosilicate white glass bottle	

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	1.19812.0500 ¹	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
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	1.19897.0500 ¹	100 mL	39883
Chromate	H ₂ O	500 mL	1.19780.0500 ¹	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	1.19533.0500 ¹	100 mL	90157
Fluoride	H ₂ O	500 mL	1.19814.0500 ¹	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	1.19811.0500 ¹	100 mL	74246
Nitrite	H ₂ O	500 mL	1.19899.0500 ¹	100 mL	67276
Palladium	HNO ₃	100 mL	1.14282.0100	100 mL	77091
Phosphate	H ₂ O	500 mL	1.19898.0500 ¹	100 mL	38364
Platinum	HCl	100 mL	1.70219.0100	100 mL	19078
Potassium	HNO ₃	100 mL	1.70219.0100	100 mL	06335
Silicon	HNO ₃	100 mL	1.70236.0100	100 mL	08729
	NaOH			100 mL	15747
Silver	HNO ₃	100 mL	1.19797.0100	100 mL	12818
Sulfate	H ₂ O	500 mL	1.19813.0500 ¹	100 mL	90071
Tin	HCl	100 mL	1.70242.0100	100 mL	92615
TOC	H ₂ O	100 mL	1.09017.0100 ¹		
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 Certified Reference Material (CRM) and Certipur® Reference Material Solutions (RM)

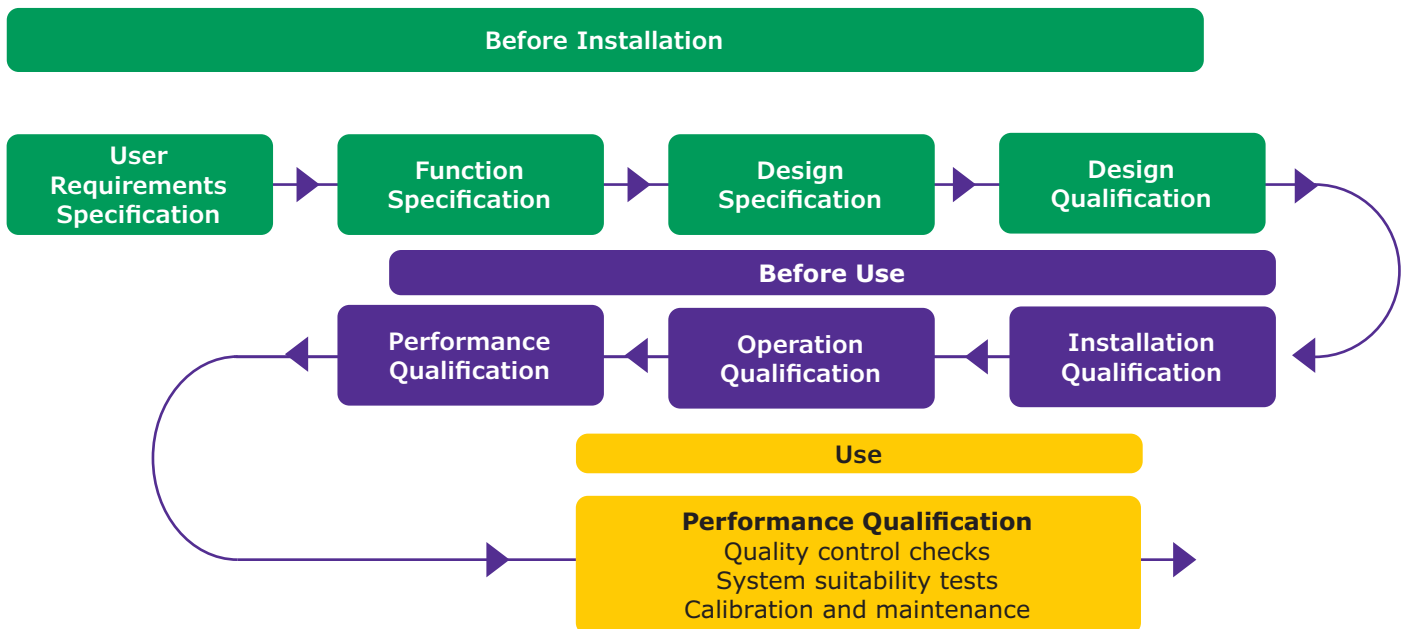
Using our UV/Vis solutions, the consistent and correct function of your UV/Vis spectrophotometer can be detected throughout the whole timeline of analytical Instrument Qualification (AIQ).

Our product program consists of double-certified solutions acc. to ISO 17025 and ISO/IEC 34 as well as Certipur® reference solution. The solutions are either manufactured acc. to Ph.Eur. or USP<857>.

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

	Certified Reference Material Solutions	Certipur® Reference Solutions
Features		Manufactured acc. to Ph.Eur. Ready-to-use solutions Packaged in amber glass ampoules for increased stability
Parameters detected	<ul style="list-style-type: none"> • Absorbance • Stray light • Spectral resolution • Wavelength accuracy 	

Qualification Processes



Certipur® Reference Solutions

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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