MERCK

Undisputed Accuracy for Your Quantitative Results

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

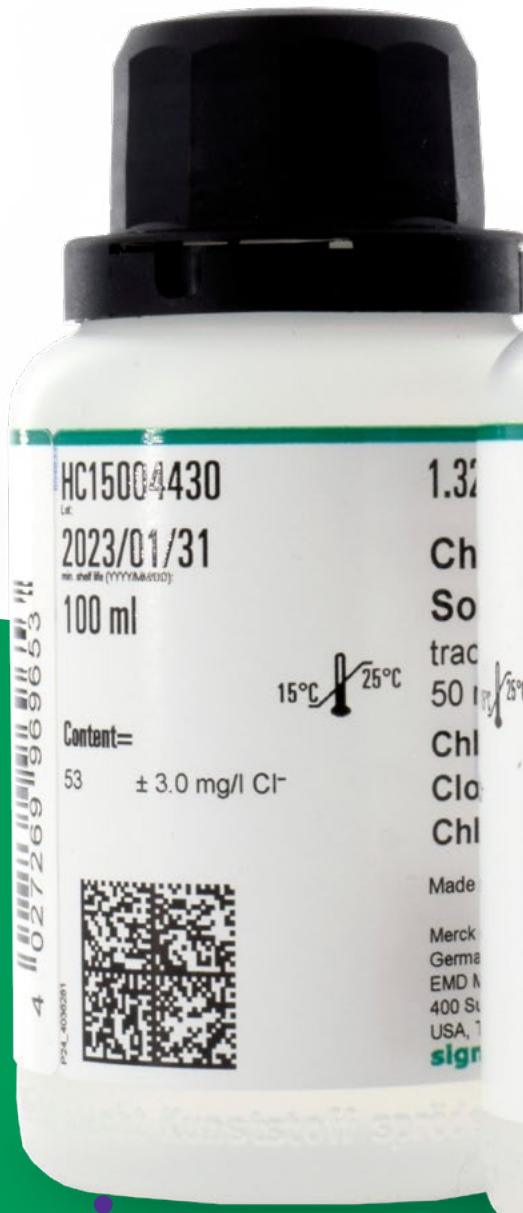
The Life Science business of Merck operates as MilliporeSigma in the U.S. and Canada.

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

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

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_2O	3-5	ICP-OES	**1.32225.0100**
	Ammonium Standard Solution	0.250 mg/L NH_4^+	± 0.011 mg/L NH_4^+	NH_4Cl in H_2O	4-6	Photometry	**1.32227.0100**
	Ammonium Standard Solution	0.400 mg/L NH_4–N	± 0.012 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25022.0100**
	Ammonium Standard Solution	1.00 mg/L NH_4–N	± 0.04 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25023.0100**
	Ammonium Standard Solution	2.00 mg/L NH_4–N	± 0.07 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25024.0100**
	Ammonium Standard Solution	6.00 mg/L NH_4–N	± 0.13 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25025.0100**
	Ammonium Standard Solution	12.0 mg/L NH_4–N	± 0.4 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25026.0100**
	Ammonium Standard Solution	50.0 mg/L NH_4–N	± 1.2 mg/L NH_4–N	NH_4Cl in H_2O	4-6	Photometry	**1.25027.0100**
	Arsenic Standard Solution [1]	1.00 mg/L As	± 0.05 mg/L As	H_3AsO_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_2O	-	-	**1.00718.0001**
	Bromate Standard Solution	0.1000 mg/L BrO_3^-	± 0.0040 mg/L BrO_3^-	$KBrO_3$ in H_2O	6-8	IC	**1.33007.0100**
C	Chloride Standard Solution	10.0 mg/L Cl^-	± 0.5 mg/L Cl^-	NaCl in H_2O	5-7	Photometry	**1.32229.0100**
	Chloride Standard Solution	50 mg/L Cl^-	± 3 mg/L Cl^-	NaCl in H_2O	5-7	Photometry	**1.32230.0100**
	Chloride Standard Solution	250 mg/L Cl^-	± 8 mg/L Cl^-	NaCl in H_2O	5-7	Photometry	**1.32231.0100**
	Chromium Standard Solution	0.050 mg/L Cr(VI)	± 0.002 mg/L Cr(VI)	K_2CrO_4 in H_2O	6-8	ICP-OES	**1.33012.0100**
	Chromium Standard Solution	1.00 mg/L Cr(VI)	± 0.03 mg/L Cr(VI)	K_2CrO_4 in H_2O	6-8	Photometry	**1.33013.0100**
	COD Standard Solution	20.0 mg/L COD	± 0.7 mg/L COD	KHP in H_2O	4-6	Photometry	**1.25028.0100**
	COD Standard Solution	100 mg/L COD	± 3 mg/L COD	KHP in H_2O	4-6	Photometry	**1.25029.0100**
	COD Standard Solution	200 mg/L COD	± 4 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25030.0100**
	COD Standard Solution	400 mg/L COD	± 5 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25031.0100**
	COD Standard Solution	1,000 mg/L COD	± 11 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25032.0100**
	COD Standard Solution	2,000 mg/L COD	± 32 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25033.0100**
	COD Standard Solution	8,000 mg/L COD	± 68 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25034.0100**
	COD Standard Solution	50,000 mg/L COD	± 894 mg/L COD	KHP in H_2O	3-5	Photometry	**1.25035.0100**
F	Fluoride Standard Solution	0.200 mg/L F^-	± 0.012 mg/L F^-	NaF in H_2O	4-6	Photometry	**1.32234.0100**
	Fluoride Standard Solution	0.50 mg/L F^-	± 0.02 mg/L F^-	NaF in H_2O	4-6	Photometry	**1.32233.0100**
	Fluoride Standard Solution	1.00 mg/L F^-	± 0.03 mg/L F^-	NaF in H_2O	4-6	Photometry	**1.32235.0100**
	Fluoride Standard Solution	1.50 mg/L F^-	± 0.04 mg/L F^-	NaF in H_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	5-7	Photometry	**1.25042.0100**
	Nitrogen (total) Standard Solution	2.50 mg/L N	± 0.06 mg/L N	Glycin in H_2O	5-7	Photometry	**1.25043.0100**
	Nitrogen (total) Standard Solution	12.0 mg/L N	± 0.3 mg/L N	Glycin in H_2O	5-7	Photometry	**1.25044.0100**
	Nitrogen (total) Standard Solution	100 mg/L N	± 3 mg/L N	Glycin in H_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	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_2O	6-8	Photometry	**1.32245.0100**
	Sulfate Standard Solution	40 mg/L SO_4^{2-}	± 6 mg/L SO_4^{2-}	Na_2SO_4 in H_2O	4-6	Photometry	**1.25050.0100**
	Sulfate Standard Solution	125 mg/L SO_4^{2-}	± 6 mg/L SO_4^{2-}	Na_2SO_4 in H_2O	4-6	Photometry	**1.25051.0100**
	Sulfate Standard Solution	400 mg/L SO_4^{2-}	± 20 mg/L SO_4^{2-}	Na_2SO_4 in H_2O	4-6	Photometry	**1.25052.0100**
	Sulfate Standard Solution	800 mg/L SO_4^{2-}	± 27 mg/L SO_4^{2-}	Na_2SO_4 in H_2O	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_2O	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_2O	4-6	Photometry	**1.33023.0100**
T	TOC Standard Solution	5.00 mg/L TOC	± 0.10 mg/L TOC	KHP in H_2O	4-6	TOC-Analyzer	**1.32246.0100**
	TOC Standard Solution	10.0 mg/L TOC	± 0.2 mg/L TOC	KHP in H_2O	4-6	TOC-Analyzer	**1.32247.0100**
	TOC Standard Solution	25.0 mg/L TOC	± 0.5 mg/L TOC	KHP in H_2O	4-6	TOC-Analyzer	**1.32248.0100**
	TOC Standard Solution	50.0 mg/L TOC	± 1.0 mg/L TOC	KHP in H_2O	3-5	TOC-Analyzer	**1.32249.0100**
	TOC Standard Solution	100 mg/L TOC	± 2 mg/L TOC	KHP in H_2O	3-5	TOC-Analyzer	**1.32251.0100**
	TOC Standard Solution	200 mg/L TOC	± 4 mg/L TOC	KHP in H_2O	3-5	TOC-Analyzer	**1.32252.0100**
	TOC Standard Solution	500 mg/L TOC	± 10 mg/L TOC	KHP in H_2O	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**

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_2O_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_2O_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	**Standard Solution Reagent R-1**
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-}	**1.14791.0001**	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^-	**1.14730.0001**	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	
	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	**1.00474.0001**	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	
	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^-	**1.14730.0001**	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	**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	**1.00475.0001**	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	
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	**Addition Solution Reagent R-2** (for spiking of samples)
	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	
	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	**Standard Solution Reagent R-1**
	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**	10	9	
	5.0	±0.7 mg/L N	**1.14537.0001**	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	**Addition Solution Reagent R-2** (for spiking of samples)
	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**	
Chloride	125	±13 mg/L Cl^-	**1.14897.0001/ .0002**	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^-	**1.14897.0001/ .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**	
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	**1.14555.0001**	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**	
COD	1,500	±150 mg/L COD	**1.14691.0001**	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	**1.00475.0001**	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
	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
	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

Standard Solution Reagent R-1

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

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
	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
	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

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

Certipur® and *Trace*CERT® 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 *Trace*CERT® Certified Reference Material Standard Solutions.

Ion chromatography standards

Certipur®	*Trace*CERT®
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 *Trace*CERT® Mercury solution, which is bottled in 100 mL borosilicate white glass bottle

ICP/AAS spectroscopy standards

Certipur®	*Trace*CERT®
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 *Trace*CERT® 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	*Trace*CERT® Order no
Aluminium	HNO_3	100 mL	**1.19770.0100**	100 mL	61935
Ammonium	H_2O	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_2O	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_2O	500 mL	**1.19897.0500** [1]	100 mL	39883
Chromate	H_2O	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_2O	500 mL	**1.19533.0500** [1]	100 mL	90157
Fluoride	H_2O	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_2O	100 mL	**1.70227.0100**	100 mL	68780
Nickel	HNO_3	100 mL	**1.70336.0100**	100 mL	28944
Nitrate	H_2O	500 mL	**1.19811.0500** [1]	100 mL	74246
Nitrite	H_2O	500 mL	**1.19899.0500** [1]	100 mL	67276
Palladium	HNO_3	100 mL	**1.14282.0100**	100 mL	77091
Phosphate	H_2O	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_2O	500 mL	**1.19813.0500** [1]	100 mL	90071
Tin	HCl	100 mL	**1.70242.0100**	100 mL	92615
TOC	H_2O	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)

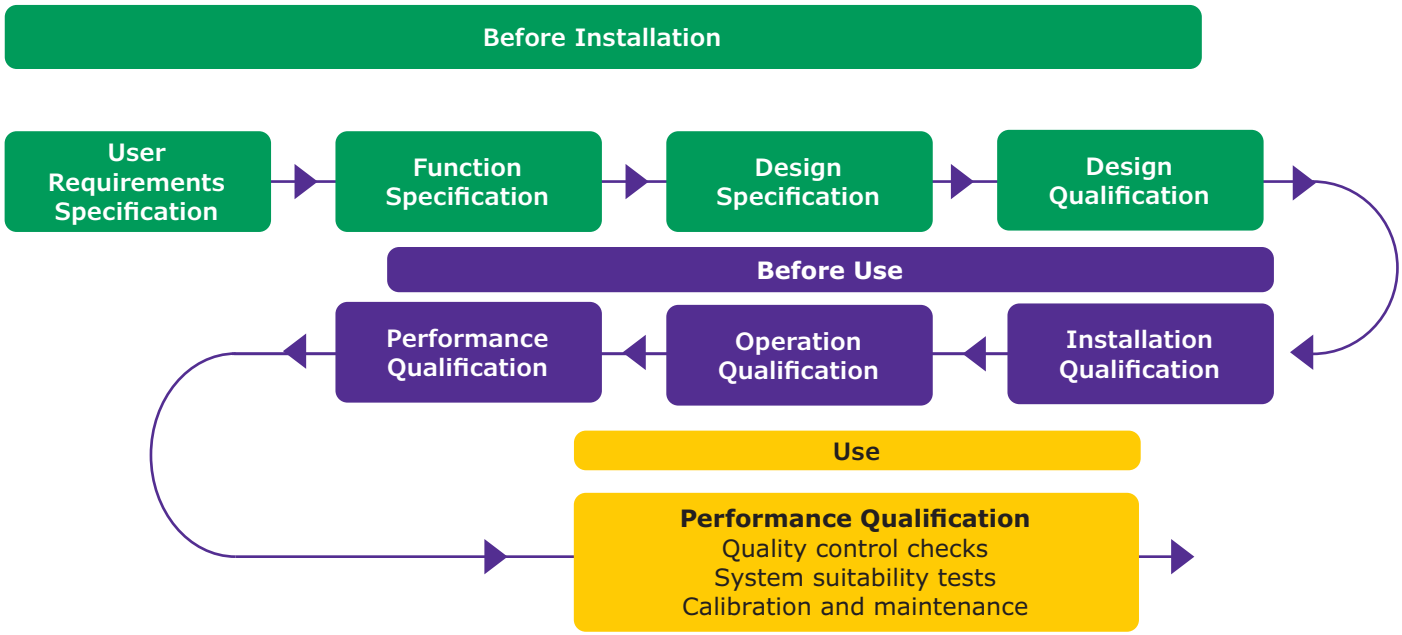
Using our UV/Vis solutions, the consistent and correct function of your UV/Vis spectrophotometer can be detected throughout the whole timeline of analytical Instrument Qualification (AIQ).

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	• 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 soution 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**

Supelco®
Analytical Products

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64293 Darmstadt, Germany

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