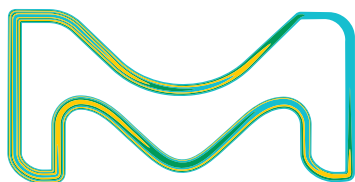


Undisputed Accuracy for Your Quantitative Results

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



Diluted Certified Reference Materials ready-to-use

Experience absolute precision with our ready-to-use diluted certified reference materials (CRMs). Thanks to their exact concentrations, expanded measurement uncertainty, and direct traceability to NIST primary reference materials, our CRMs 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 CRM simplifies accreditation:
[MerckMillipore.com/crm-standards](https://www.merckmillipore.com/crm-standards)

Compatible with Spectroquant® test kits or those from other suppliers

Ready-to-use, diluted CRMs 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 certified standard solutions with Spectroquant® Prove spectrophotometers.



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

Standard Solutions, traceable to SRM from NIST

		Product	Concentration	Expanded Measurement Uncertainty	Composition	pH Range Solution	Method used for Uncertainty Measurement	Ord. No.
A	NEW	Aluminium Standard Solution	0.0500 mg/L Al	± 0.0020 mg/L Al	Al(NO ₃) ₃ in H ₂ O	3-5	ICP-OES	1322260100
	NEW	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	1322250100
	NEW	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	1322270100
		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	1250220100
		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	1250230100
		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	1250240100
		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	1250250100
		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	1250260100
		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	1250270100
	NEW	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	1330020250
B	NEW	Boron Standard Solution	1.00 mg/L B	± 0.06 mg/L B	H ₃ BO ₃ in H ₂ O	5-7	Photometry	1330050100
	NEW	Bromate Standard Solution	0.0100 mg/L BrO ₃ ⁻	± 0.0006 mg/L BrO ₃ ⁻	KBrO ₃ in H ₂ O	6-8	IC	1330060100
	NEW	Bromate Standard Solution	0.1000 mg/L BrO ₃ ⁻	± 0.0040 mg/L BrO ₃ ⁻	KBrO ₃ in H ₂ O	6-8	IC	1330070100
C	NEW	Cadmium Standard Solution	0.00500 mg/L Cd	± 0.00200 mg/L Cd	Cd(NO ₃) ₂ in HNO ₃	3-4	ICP-OES	1330080100
	NEW	Cadmium Standard Solution	0.100 mg/L Cd	± 0.003 mg/L Cd	Cd(NO ₃) ₂ in H ₂ O	3-5	ICP-OES	1322280100
	NEW	Chloride Standard Solution	0.100 mg/L Cl ⁻	± 0.006 mg/L Cl ⁻	NaCl in H ₂ O	5-7	IC	1330090100
	NEW	Chloride Standard Solution	1.00 mg/L Cl ⁻	± 0.04 mg/L Cl ⁻	NaCl in H ₂ O	5-7	IC	1330100100
	NEW	Chloride Standard Solution	2.50 mg/L Cl ⁻	± 0.08 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1330110100
	NEW	Chloride Standard Solution	10.0 mg/L Cl ⁻	± 0.5 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1322290100
	NEW	Chloride Standard Solution	50 mg/L Cl ⁻	± 3 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1322300100
	NEW	Chloride Standard Solution	250 mg/L Cl ⁻	± 8 mg/L Cl ⁻	NaCl in H ₂ O	5-7	Photometry	1322310100
	NEW	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	1330120100
	NEW	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	1330130100
		COD Standard Solution	20.0 mg/L COD	± 0.7 mg/L COD	KHP in H ₂ O	4-6	Photometry	1250280100
		COD Standard Solution	100 mg/L COD	± 3 mg/L COD	KHP in H ₂ O	4-6	Photometry	1250290100
		COD Standard Solution	200 mg/L COD	± 4 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250300100
		COD Standard Solution	400 mg/L COD	± 5 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250310100
		COD Standard Solution	1,000 mg/L COD	± 11 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250320100
		COD Standard Solution	2,000 mg/L COD	± 32 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250330100
		COD Standard Solution	8,000 mg/L COD	± 68 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250340100
		COD Standard Solution	50,000 mg/L COD	± 894 mg/L COD	KHP in H ₂ O	3-5	Photometry	1250350100
F	NEW	Fluoride Standard Solution	0.200 mg/L F ⁻	± 0.012 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1322340100
	NEW	Fluoride Standard Solution	0.50 mg/L F ⁻	± 0.02 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1322330100
	NEW	Fluoride Standard Solution	1.00 mg/L F ⁻	± 0.03 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1322350100
	NEW	Fluoride Standard Solution	1.50 mg/L F ⁻	± 0.04 mg/L F ⁻	NaF in H ₂ O	4-6	Photometry	1322360100

¹ 250 mL bottle

	Product	Concentration	Expanded Measurement Uncertainty	Composition	pH Range Solution	Method used for Uncertainty Measurement	Ord. No.
I	NEW 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	1330140100
	NEW 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	1330180100
	NEW Iron Standard Solution	0.300 mg/L Fe(III)	± 0.009 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	Photometry	1330190100
	NEW Iron Standard Solution	1.00 mg/L Fe(III)	± 0.04 mg/L Fe(III)	Fe(NO ₃) ₃ in HNO ₃	2	Photometry	1330200100
L	NEW Lead Standard Solution	0.0500 mg/L Pb	± 0.0040 mg/L Pb	Pb(NO ₃) ₂ in HNO ₃	3,5-4,5	ICP-OES	1330030100
	NEW 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	1330040100
M	NEW Manganese Standard Solution	0.050 mg/L Mn	± 0.004 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1322370100
	NEW Manganese Standard Solution	0.200 mg/L Mn	± 0.005 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1322380100
	NEW Manganese Standard Solution	1.00 mg/L Mn	± 0.03 mg/L Mn	Mn(NO ₃) ₂ in H ₂ O	3-5	Photometry	1322390100
N	NEW Nitrate Standard Solution	1.00 mg/L NO ₃ ⁻	± 0.03 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	IC	1322400100
	NEW Nitrate Standard Solution	10.0 mg/L NO ₃ ⁻	± 0.3 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	Photometry	1322410100
	NEW Nitrate Standard Solution	50.0 mg/L NO ₃ ⁻	± 2.0 mg/L NO ₃ ⁻	NaNO ₃ in H ₂ O	5-7	Photometry	1322420100
	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	1250360100
	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	1250370100
	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	1250380100
	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	1250390100
	Nitrate Standard Solution	200 mg/L NO ₃ ⁻ N	± 5 mg/L NO ₃ ⁻ N	NaNO ₃ in H ₂ O	5-7	Photometry	1250400100
	NEW Nitrite Standard Solution	0.0100 mg/L NO ₂ ⁻	± 0.0012 mg/L NO ₂ ⁻	NaNO ₂ in NaOH	8,5-9,5	IC	1330210100
	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	1250410100
	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	1250420100
	Nitrogen (total) Standard Solution	2.50 mg/L N	± 0.06 mg/L N	Glycin in H ₂ O	5-7	Photometry	1250430100
	Nitrogen (total) Standard Solution	12.0 mg/L N	± 0.3 mg/L N	Glycin in H ₂ O	5-7	Photometry	1250440100
	Nitrogen (total) Standard Solution	100 mg/L N	± 3 mg/L N	Glycin in H ₂ O	5-7	Photometry	1250450100
	Phosphorus 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	1250460100
P	Phosphorus 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	1250470100
	Phosphorus 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	1250480100
	Phosphorus 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	1250490100

Free CoA

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

[MerckMillipore.com/coa](https://www.merckmillipore.com/coa)

	Product	Concentration	Expanded Measurement Uncertainty	Composition	pH Range Solution	Method used for Uncertainty Measurement	Ord. No.
S	NEW Silicate Standard Solution	0.1000 mg/L SiO ₂	± 0.0040 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1322440100
	NEW Silicate Standard Solution	0.500 mg/L SiO ₂	± 0.025 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1322430100
	NEW Silicate Standard Solution	1.000 mg/L SiO ₂	± 0.030 mg/L SiO ₂	SiO ₂ in H ₂ O	6-8	Photometry	1322450100
	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	1250500100
	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	1250510100
	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	1250520100
	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	1250530100
	NEW 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	1330220100
	NEW 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	1330230100
T	NEW Surfactants nonionic Standard Solution ²	10.00 mg/L Triton® X-100	± 0.60 mg/L Triton® X-100	Triton X-100® in H ₂ O	4-6	Photometry	1330240100
	NEW TOC Standard Solution	5.00 mg/L TOC	± 0.10 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1322460100
	NEW TOC Standard Solution	10.0 mg/L TOC	± 0.2 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1322470100
	NEW TOC Standard Solution	25.0 mg/L TOC	± 0.5 mg/L TOC	KHP in H ₂ O	4-6	TOC-Analyzer	1322480100
	NEW TOC Standard Solution	50.0 mg/L TOC	± 1.0 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1322490100
	NEW TOC Standard Solution	100 mg/L TOC	± 2 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1322510100
	NEW TOC Standard Solution	200 mg/L TOC	± 4 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1322520100
	NEW TOC Standard Solution	500 mg/L TOC	± 10 mg/L TOC	KHP in H ₂ O	3-5	TOC-Analyzer	1322530100

² Traceable to USP

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 and in the package leaflet. 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 Certified 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)

Certified Reference Material (CRM)

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



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 achieved, 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 [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
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	±0.25 mg/L NO ₃ -N	1.14556.0001	2.0	48	
	2.50	±0.25 mg/L NO ₃ -N	1.14773.0001 ²	1.5	64	
	2.50	±0.25 mg/L NO ₃ -N	1.09713.0001 ³	1.0	96	
Phosphate ⁴	0.80	±0.08 mg/L PO ₄ -P	1.00474.0007	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	1.14848.0007 ³ / .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	Addition Solution Reagent R-2 (for spiking of samples)
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	
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

Spectroquant® CombiCheck 20					Ord. No. 1.14675.0001		
Parameter	Concentration [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1	
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		
	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 ¹		
	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		
Ammonium	8.0	±0.8 mg/L NH ₄ -N	1.14544.0001	0.10	280		Addition Solution Reagent R-2 (for spiking of samples)
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		
	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 [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1	
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		
	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		
Ammonium	1.000	±0.100 mg/L NH ₄ -N	1.14739.0001	0.10	280		Addition Solution Reagent R-2 (for spiking of samples)
	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		
	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

Spectroquant® CombiCheck Analytical Quality Assurance

Spectroquant® CombiCheck 60						Ord. No. 1.14696.0001
Parameter	Concentration [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
Chloride	125	±13 mg/L Cl ⁻	1.14897.0007/	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 ⁻	1.14897.0007/	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 [mL] and working tolerance		Can be used for test kits Ord. No.	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 ^{1,5}	0.20	480	
Ammonium (5 – 150 mg/L)	50	±5 mg/L NH ₄ -N	1.00683.0001 ^{1,5}	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	
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 ^{1,5}	0.10	280	
Ammonium (5 – 150 mg/L)	20	±2 mg/L NH ₄ -N	1.00683.0001 ^{1,5}	0.10	280	
COD	2,000	±200 mg/L COD	1.14555.0007	0.10	280	
	20	±6 mg/L N	1.14763.0001	0.10	280	

Spectroquant® CombiCheck 80						Ord. No. 1.14738.0001
Parameter	Concentration [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
COD	1,500	±150 mg/L COD	1.14691.0007	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	1.00475.0007	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 When using AutoSelector, measuring range 5 - 150 mg/L NH₄-N is used

NEW

The CombiCheck 90
is replacing the
CombiCheck 30

Spectroquant® CombiCheck 90**Ord. No. 1.18700.0001**

Parameter	Concentration [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
Cadmium	0.250	±0.030 mg/L Cd	1.01745.0001 ¹	10.0	9	Addition Solution Reagent R-2 (for spiking of samples)
	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	
	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 [mL] and working tolerance		Can be used for test kits Ord. No.	Standard solution [mL]	Number of quality checks	Standard Solution Reagent R-1
Aluminium	0.40	±0.05 mg/L Al	1.00594.0001	6.0	16	Addition Solution Reagent R-2 (for spiking of samples)
	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	
	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	±0.10 mg/L Zn	1.14832.0001	0.10	280	

¹ Using a 10 mm rectangular cell, Ord. No. 1.14946.0001² Using a 20 mm rectangular cell, Ord. No. 1.14947.0001³ Using a 50 mm rectangular cell, Ord. No. 1.14944.0001⁴ Only the determination of ortho-phosphate can be checked⁵ When using AutoSelector, measuring range 5 - 150 mg/L NH₄-N is used

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.



Certipur®		TraceCERT®
Anionic solution	Cationic solution	Anionic and cationic solutions
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Unique level of accuracy and lot-specific value		
		Produced according to ISO Guide 34
		Analysed in our ISO/IEC 17025 accredited lab
Directly traceable to the corresponding NIST CRMs		Traceable to at least two independent references (NIST, BAM or SI unit kg)
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

A batch specific certificate is available via internet
SigmaAldrich.com

Ion	Matrix	Pack size	Certipur® Order no	Pack size	TraceCERT® Order no
Aluminium	HNO ₃	100 mL	1.19770.0100	250 mL	39435
Ammonium	H ₂ O	500 mL	1.19812.0500	100 mL	59755
Antimon	HNO ₃	100 mL	1.70204.0100	250 mL	94117
Arsenic	HNO ₃	100 mL	1.19773.0100	250 mL	39436
Barium	HNO ₃	100 mL	1.19774.0100	250 mL	90092
Boron	H ₂ O	100 mL	1.19500.0100	250 mL	40591
Cadmium	HNO ₃	100 mL	1.19777.0100	250 mL	51994
Calcium	HNO ₃	100 mL	1.19778.0100	250 mL	69349
Chloride	H ₂ O	500 mL	1.19897.0500	100 mL	39883
Chromate	H ₂ O	500 mL	1.19780.0500	100 mL	40121
Chromium	HNO ₃	100 mL	1.19779.0100	250 mL	02733
Cobalt	HNO ₃	100 mL	1.19785.0100	250 mL	05202
Copper	HNO ₃	100 mL	1.19786.0100	250 mL	38996
Cyanide	H ₂ O	500 mL	1.19533.0500	100 mL	90157
Fluoride	H ₂ O	500 mL	1.19814.0500	100 mL	77365
Gold	HCl	100 mL	1.70216.0100	100 mL	08269
Iron	HNO ₃	100 mL	1.19781.0100	250 mL	16596
Lead	HNO ₃	100 mL	1.19776.0100	250 mL	16595
Magnesium	HNO ₃	100 mL	1.19788.0100	250 mL	42992
Manganese	HNO ₃	100 mL	1.19789.0100	250 mL	77036
Mercury	HNO ₃	100 mL	1.70226.0100	100 mL	16482
Molybdenum	H ₂ O	100 mL	1.70227.0100	250 mL	67210
Nickel	HNO ₃	100 mL	1.19792.0100	250 mL	42242
Nitrate	H ₂ O	500 mL	1.19811.0500	100 mL	74246
Nitrite	H ₂ O	500 mL	1.19899.0500	100 mL	67276
Palladium	HNO ₃	100 mL	1.14282.0100	100 mL	78437
Phosphate	H ₂ O	500 mL	1.19898.0500	100 mL	38364
Platinum	HCl	100 mL	1.70219.0100	100 mL	47037
Potassium	HNO ₃	100 mL	1.70230.0100	250 mL	96665
Silver	HNO ₃	100 mL	1.19797.0100	250 mL	39361
Silicon	NaOH	100 mL	1.70236.0100	250 mL	16259
Sulfate	H ₂ O	500 mL	1.19813.0500	100 mL	90071
Tin	HCl	100 mL	1.70242.0100	250 mL	74244
Vanadium	HNO ₃	100 mL	1.19809.0100	250 mL	02334
Zinc	HNO ₃	100 mL	1.19806.0100	250 mL	18827



Analytical Instrument Qualification of Photometric Equipment

UV/Vis Certified Reference Material (CRM) and Certipur® Reference Material Solutions (RM)

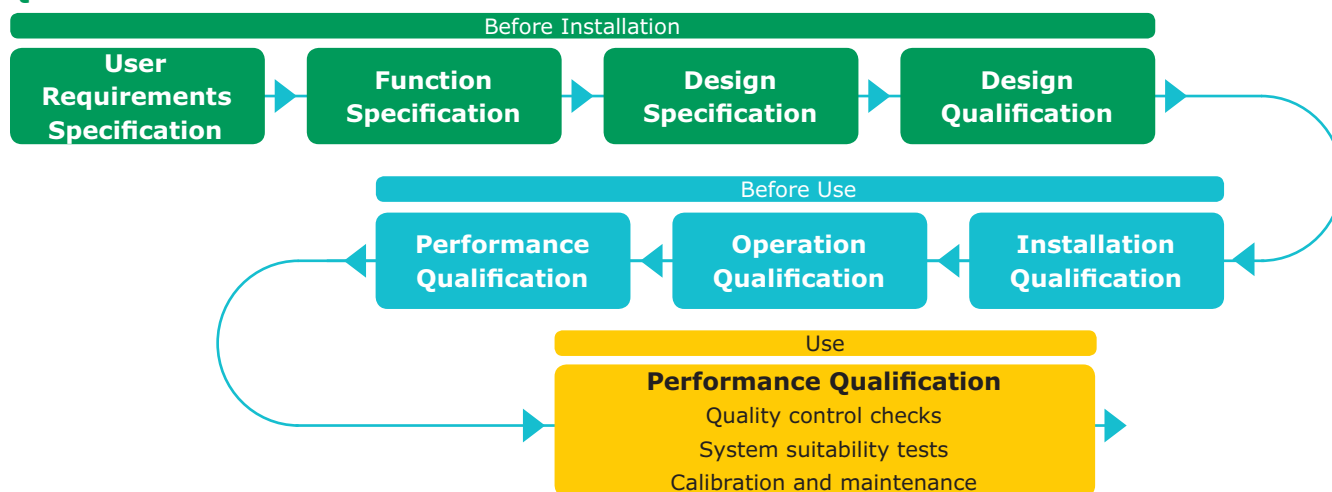
Using our UV/Vis solutions, the consistent and correct function of your UV/Vis spectrophotometer can be detected throughout the whole timeline of analytical Instrument Qualification (AIQ).

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
Application	During the qualification process • At instrument installation (new, old or existing unqualified instrument) • After installation or major repair of an instrument • Periodically at specified intervals for each instrument	During operation • For quality control checks • For system suitability tests • For calibration and maintenance
Features	Double-certified solutions according to ISO17025 and ISO Guide 34	
	Manufactured acc. to Ph.Eur.	
	Manufactured acc. to USP<857>	
	Ready-to-use solutions	
	Packaged in amber glass ampoules for increased stability	
Parameters detected	• Absorbance • Stray light • Spectral resolution • Wavelength accuracy	

Qualification Processes



Certified Reference Material Solutions

Product	Description	Order No
UV Photometric Accuracy Standards acc. to Ph.Eur.	Standard: 2x10 mL $K_2Cr_2O_7$ – 60.06 mg/L in H_2SO_4 / 0.01N Blank: 1x10 mL H_2SO_4 / 0.01N	Z804452
UV Resolution Standard acc. to Ph.Eur.	Standard: 1x10 mL 0.02%(v/v) toluene in n-Hexane Blank: 1x10 mL n-Hexane	Z894568
UV Stray Light Standards acc. to Ph.Eur.	Standard: 1x10 mL KCl 12 g/L in H_2O Blank: 1x10 mL H_2O	Z804665
UV Spec Qualification Kit	Contains Z804452, Z804568, Z804665	Z804789
UV5, UV25 for testing wavelength accuracy, UV5 for 240-650nm; UV25 for 730-870nm acc. to USP <857>	Holmium in perchloric acid (667-UV5: Calibration standard, consisting of a standard cell containing 40g/L Ho_2O_3 in 10% $HClO_4$. The cell is permanently sealed.) Didymium in perchloric acid (667-UV25: Calibration standard, consisting of a standard cell containing Didymium (Neodymium & Praseodymium) in 10% $HClO_4$. The cell is permanently sealed.)	Z804800
UV1, UV1H for testing stray light from 190-205nm acc. to USP <857>	Potassium chloride in purified water (667-UV1: wavelength [nm] 200 (cut-off), pathlength 10 mm) Potassium chloride in purified water, reference filter (667-UV1H: wavelength [nm] 200 (cut-off), pathlength 5 mm)	Z805459
UV10, UV10H for testing stray light from 210-259nm acc. to USP <857>	Sodium iodide in purified water (667-UV10: wavelength [nm] 259 (cut-off), pathlength 10 mm) Sodium iodide in purified water reference filter (667-UV10H: wavelength [nm] 259 (cut-off), pathlength 5 mm)	Z805564
UV11, UV11H for testing stray light from 300-385nm acc. to USP <857>	Sodium nitrite in purified water (667-UV11: wavelength [nm] 385 (cut-off), pathlength 10 mm) Sodium nitrite in purified water reference filter (667-UV11H: wavelength [nm] 385 (cut-off), pathlength 5 mm)	Z805661
UV19, UV19H testing stray light from 205-320nm acc. to USP <857>	Acetone (667-UV19: wavelength [nm] 325 (cut-off), pathlength 10 mm) Acetone reference filter (667-UV19H: wavelength [nm] 25 (cut-off), pathlength 5 mm)	Z805785
UV1, UV1H, UV10, UV10H, UV11, UV11H, UV19, UV19H testing stray light acc. to USP <857>	Set of Z805459, Z805564, Z805661, Z805785	Z805890

Certipur® Reference Solutions

Product	Description	Order No
UV/Vis Standard 1 – Potassium dichromate for absorbance acc. to Ph.Eur.	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 for the absorbance at 430 nm acc. to Ph.Eur.	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 for straylight testing acc. to Ph.Eur.	3x10 mL $NaNO_2$ 50g/L in H_2O	1.08161.0001
UV/Vis Standard 3 Sodium iodide solution for straylight testing acc. to Ph.Eur.	3x10 mL NaI 10 g/L in H_2O	1.08163.0001
UV/Vis Standard 4 Potassium chloride solution for straylight testing acc. to Ph.Eur.	3x10 mL KCl 12 g/L in H_2O	1.08164.0001
UV/Vis Standard 5 Toluene solution in hexane for testing the resolution acc. to Ph.Eur.	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 reference material for wavelength accuracy	3x10 mL Ho_2O_3 40 g/L in $HClO_4$ (10% v/v)	1.08166.0001



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