

# Programming Data for Spectroquant® Test Kits

## Calibration Information: wavelength, slope and blank value

For swift, secure analysis, there's no better choice than Spectroquant® test kits. Consisting of validated, standard-compliant reagents, the kits are pre-programmed for use with Spectroquant® instruments to ensure rapid, reliable results. As a result of their excellent quality, most of our kits conform to international standards, allowing you to test with absolute confidence.

**Spectroquant® Reagent Tests** contain all reagents for your photometric analyses and can be used with any existing cells of various pathlengths (10 - 100-mm rectangular cells or 16-mm round cells). The measurement range and programming data depend on the size of the cells (which must be acquired separately). In the table below, these Reagent Tests are abbreviated as **RT**.

**Spectroquant® Cell Tests** are ready-to-use 16-mm round cells pre-filled with reagents; no additional cell is needed. They are even more easy-to-use and convenient. In the table below, these Cell Tests are abbreviated as **CT**.

All test kits can be used seamlessly with **Spectroquant® Photometers**. Calibration data are pre-programmed, and the workflow is designed to enable fast and reliable results with additional features for convenience. For example, the **Spectroquant® Prove** photometer series can read Live ID barcodes that provide batch-specific information such as the shelf-life. It also automatically recognizes the inserted cell and adapts the measurement range to display the correct result without any action needed from the user. The system also includes ready-to-use reference materials and is designed to comply with highest requirements in terms of analytical quality assurance. For further details, please visit [www.sigmaaldrich.com/photometry](http://www.sigmaaldrich.com/photometry).



If you already have a photometer in your lab and want to experience the outstanding quality and reliability of the Spectroquant® test kit series, you may use the programming data provided in this document. Please note that we cannot guarantee the quality of measurement results in this case, as we do not control the performance of your photometer in terms of wavelength precision, repeatability, and linearity of absorbance. But if your instrument is high-quality, and is regularly subjected to the appropriate quality assurance (e.g. with Supelco® reference standards), Spectroquant® test kits can provide a unique experience in terms of precision, convenience, and compliance.

For test kits with a linear calibration function, one needs wavelength, slope and the type of blank (zero) you need to measure. These can be:

- Dist. Water (DW) means distilled water without reagents and poured into the same type of cell used for the measurement.
- Own blank (OB) means distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used.
- Sample blank (SB) means to measure the sample material as a blank, without reagents in the cell.

If the calibration function of the respective test kit is not linear, you will find the remark (A) in the factor information of the same table to improve readability and the respective information is given on page 15. If you need more information, please contact our technical service at [www.sigmaaldrich.com](http://www.sigmaaldrich.com), or your trusted dealer.

## Programming Data

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Acid Capacity to pH 4.3	1.01758	CT	0.40	8.00	mmol/l	OH	16	A)	605	DW
			0.40	8.00	mmol/l	OH	10			
			20	400	mg/l	CaCO <sub>3</sub>	16			
			20	400	mg/l	CaCO <sub>3</sub>	10			
Acid Capacity to pH 4.3	1.01762	CT	replaced by 1.01758							
Alcohol	Test deleted									
Alkalinity	see Acid capacity to pH 4.3									
Aluminium	1.14825	RT	0.10	1.20	mg/l	Al	10	A)	550	DW
			0.020	0.200	mg/l	Al	50			
Aluminium	1.00594	CT	0.02	0.50	mg/l	Al	16	A)	545	DW
			0.02	0.50	mg/l	Al	10			
Ammonium	1.14739	CT	0.010	2.000	mg/l	NH <sub>4</sub> -N	16	0.877	690	OB
			0.010	2.000	mg/l	NH <sub>4</sub> -N	10	1.18		
			0.01	2.58	mg/l	NH <sub>4</sub> <sup>+</sup>	16	1.13		
			0.01	2.58	mg/l	NH <sub>4</sub> <sup>+</sup>	10	1.53		
			0.010	2.000	mg/l	NH <sub>3</sub> -N	16	0.877		
			0.010	2.000	mg/l	NH <sub>3</sub> -N	10	1.18		
			0.01	2.43	mg/l	NH <sub>3</sub>	16	1.065		
0.01	2.43	mg/l	NH <sub>3</sub>	10	1.433					
Ammonium	1.14752	RT	0.05	3.00	mg/l	NH <sub>4</sub> -N	10	1.23	690	OB
			0.03	1.50	mg/l	NH <sub>4</sub> -N	20	0.615		
			0.010	0.500	mg/l	NH <sub>4</sub> -N	50	0.246		
			0.06	3.86	mg/l	NH <sub>4</sub> <sup>+</sup>	10	1.58		
			0.04	1.93	mg/l	NH <sub>4</sub> <sup>+</sup>	20	0.792		
			0.013	0.644	mg/l	NH <sub>4</sub> <sup>+</sup>	50	0.316		
			0.05	3.00	mg/l	NH <sub>3</sub> -N	10	1.23		
			0.03	1.50	mg/l	NH <sub>3</sub> -N	20	0.615		
			0.010	0.500	mg/l	NH <sub>3</sub> -N	50	0.246		
			0.06	3.65	mg/l	NH <sub>3</sub>	10	1.494		
			0.04	1.82	mg/l	NH <sub>3</sub>	20	0.747		
0.016	0.608	mg/l	NH <sub>3</sub>	50	0.384					
Ammonium	1.14558	CT	0.20	8.00	mg/l	NH <sub>4</sub> -N	16	4.26	690	OB
			0.20	8.00	mg/l	NH <sub>4</sub> -N	10	5.75		
			0.26	10.30	mg/l	NH <sub>4</sub> <sup>+</sup>	16	5.49		
			0.26	10.30	mg/l	NH <sub>4</sub> <sup>+</sup>	10	7.41		
			0.20	8.00	mg/l	NH <sub>3</sub> -N	16	4.26		
			0.20	8.00	mg/l	NH <sub>3</sub> -N	10	5.75		
			0.24	9.73	mg/l	NH <sub>3</sub>	16	5.17		
			0.24	9.73	mg/l	NH <sub>3</sub>	10	6.98		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 16 - 18.

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Ammonium	1.14544	CT	0.5	16.0	mg/l	NH <sub>4</sub> -N	16	7.84	690	OB
			0.5	16.0	mg/l	NH <sub>4</sub> -N	10	10.6		
			0.6	20.6	mg/l	NH <sub>4</sub> <sup>+</sup>	16	10.1		
			0.6	20.6	mg/l	NH <sub>4</sub> <sup>+</sup>	10	13.6		
			0.5	16.0	mg/l	NH <sub>3</sub> -N	16	7.84		
			0.5	16.0	mg/l	NH <sub>3</sub> -N	10	10.6		
			0.6	19.5	mg/l	NH <sub>3</sub>	16	9.52		
			0.6	19.5	mg/l	NH <sub>3</sub>	10	12.87		
Ammonium	1.00683	RT	2.0	75.0	mg/l	NH <sub>4</sub> -N	10	27.8	690	OB
			5	150	mg/l	NH <sub>4</sub> -N	10	55.6		
			2.6	96.6	mg/l	NH <sub>4</sub> -N	10	35.8		
			6	193	mg/l	NH <sub>4</sub> <sup>+</sup>	10	71.5		
			2.0	75.0	mg/l	NH <sub>3</sub> -N	10	27.8		
			5	150	mg/l	NH <sub>3</sub> -N	10	55.6		
			2.4	91.2	mg/l	NH <sub>3</sub>	10	33.8		
			6	182	mg/l	NH <sub>3</sub>	10	67.5		
Ammonium	1.14559	CT	4.0	80.0	mg/l	NH <sub>4</sub> -N	16	36.4	690	OB
			4.0	80.0	mg/l	NH <sub>4</sub> -N	10	49.1		
			5.2	103.0	mg/l	NH <sub>4</sub> <sup>+</sup>	16	46.8		
			5,2	103.0	mg/l	NH <sub>4</sub> <sup>+</sup>	10	63.3		
			4.0	80.0	mg/l	NH <sub>3</sub> -N	16	36.4		
			4.0	80.0	mg/l	NH <sub>3</sub> -N	10	49.1		
			4.9	97.3	mg/l	NH <sub>3</sub>	16	44.2		
				97.3	mg/l	NH <sub>3</sub>	10	59.6		
AOX	1.00675	RT	0.05	2.50	mg/l	AOX	16	4.00	445	OB
			0.05	2.50	mg/l	AOX	10	5.40		
Antimony	C)	RT	0.10	8.00	mg/l	Sb	10	3.45	620	OB
Arsenic	1.01747	RT	0.005	0.100	mg/l	As	10	0.1138	525	DW
			0.001	0.020	mg/l	As	20	0.0568		
BOD	1.00687	CT	0.5	3000	mg/l	BOD	16	13.5	500	DW
			0.5	3000	mg/l	BOD	10	18.2		
Boron	1.14839	RT	0.050	0.800	mg/l	B	10	0.328	565	OB
Boron	1.00826	CT	0.05	2.00	mg/l	B	16	1.38	405	OB
			0.05	2.00	mg/l	B	10	1.86		
Bromine	1.00605	RT	0.10	10.00	mg/l	Br <sub>2</sub>	10	7.52	550	DW
			0.05	5.00	mg/l	Br <sub>2</sub>	20	3.76		
			0.020	2.000	mg/l	Br <sub>2</sub>	50	1.50		
Cadmium	1.01745	RT	0.010	0.500	mg/l	Cd	10	0.680	525	OB
			0.005	0.250	mg/l	Cd	20	0.340		
			0.002	0.100	mg/l	Cd	50	0.136		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Cadmium	1.14834	CT	0.025	1.000	mg/l	Cd	16	0.595	550	OB
			0.025	1.000	mg/l	Cd	10	0.804		
Calcium	1.00049	RT	0.20	4.00	mg/l	Ca	10	D)	565	OB
Calcium	1.14815	RT	10	160	mg/l	Ca	10	137	550	OB
			25	400	mg/l	CaCO <sub>3</sub>	10	342		
			14	224	mg/l	CaO	10	192		
			5	80	mg/l	Ca	20	68.5		
			12	200	mg/l	CaCO <sub>3</sub>	20	171		
			7	112	mg/l	CaO	20	95.9		
			1.0	15.0 B)	mg/l	Ca	10	29.4		
			2.5	37.5 B)	mg/l	CaCO <sub>3</sub>	10	73.5		
	21.0 B)	mg/l	CaO	10	41.2					
Calcium	1.00858	CT	10	250	mg/l	Ca	16	A)	565	OB
			25	625	mg/l	CaCO <sub>3</sub>	16			
			14	350	mg/l	CaO	16			
			10	250	mg/l	Ca	10			
			25	625	mg/l	CaCO <sub>3</sub>	10			
	350	mg/l	CaO	10						
Carbohydrazide	see Oxygen Scavengers									
Chloride	1.01807	RT	0.10	5.00	mg/l	Cl <sup>-</sup>	50	A)	500	OB
Chloride	1.01804	CT	0.5	15.0	mg/l	Cl <sup>-</sup>	16	A)	445	OB
			0.5	15.0	mg/l	Cl <sup>-</sup>	10			
Chloride	1.14897	RT	10	250	mg/l	Cl <sup>-</sup>	10	107	500	OB
			2.5	125	mg/l	Cl <sup>-</sup>	10	28.2		
Chloride	1.14730	CT	5	125	mg/l	Cl <sup>-</sup>	16	114	525	OB
			5	125	mg/l	Cl <sup>-</sup>	10	153		
Chlorine (free chlorine)	1.00598	RT	0.05	6.00	mg/l	Cl <sub>2</sub>	10	3.33	550	DW
			0.02	3.00	mg/l	Cl <sub>2</sub>	20	1.67		
			0.010	1000	mg/l	Cl <sub>2</sub>	50	0.667		
Chlorine (free chlorine)	1.00595	CT	0.03	6.00	mg/l	Cl <sub>2</sub>	16	2.47	550	DW
Chlorine (total chlorine)	1.00602	RT	0.05	6.00	mg/l	Cl <sub>2</sub>	10	3.33	550	DW
			0.02	3.00	mg/l	Cl <sub>2</sub>	20	1.67		
				1.000	mg/l	Cl <sub>2</sub>	50	0.667		
Chlorine (free + total chlorine)	1.00597	CT	0.03	6.00	mg/l	Cl <sub>2</sub>	16	2.47	550	DW
Chlorine (free + total chlorine)	1.00599	RT	0.05	6.00	mg/l	Cl <sub>2</sub>	10	3.33	550	DW
			0.02	3.00	mg/l	Cl <sub>2</sub>	20	1.67		
			0.010	1.000	mg/l	Cl <sub>2</sub>	50	0.667		
Chlorine (liquid) (free + total chlorine)	1.00086	RT	0.03	6.00	mg/l	Cl <sub>2</sub>	16	2.47	550	DW
	1.00087		0.010	1.000	mg/l	Cl <sub>2</sub>	50	0.667		
	1.00088		0.010	1.000	mg/l	Cl <sub>2</sub>	50	0.667		
	1.00089		0.010	1.000	mg/l	Cl <sub>2</sub>	50	0.667		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 19 - 21.

**B)** For Handling Details see Appendix page 15.

**D)** Instrument-specific calibration needed. See Appendix page 15.

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
<b>Chlorine</b>	1.14828	RT	replaced by 1.00599 or 1.00598 and 1.00602							
<b>Chlorine Dioxide</b>	1.00608	RT	0.10	10.00	mg/l	<b>ClO<sub>2</sub></b>	10	6.33	550	DW
			0.05	5.00	mg/l	<b>ClO<sub>2</sub></b>	20	3.16		
			0.020	2.000	mg/l	<b>ClO<sub>2</sub></b>	50	1.27		
<b>Chlorine Dioxide</b>	1.14732		replaced by 1.00608							
<b>Chromate</b>	1.14758	RT	0.05	3.00	mg/l	<b>Cr</b>	10	1.30	550	DW
			0.03	1.50	mg/l	<b>Cr</b>	20	0.650		
			0.010	0.600	mg/l	<b>Cr</b>	50	0.260		
			0.11	6.69	mg/l	<b>CrO<sub>4</sub><sup>2-</sup></b>	10	2.90		
			0.07	3.35	mg/l	<b>CrO<sub>4</sub><sup>2-</sup></b>	20	1.45		
			0.02	1.34	mg/l	<b>CrO<sub>4</sub><sup>2-</sup></b>	50	0.579		
<b>Chromate</b>	1.14552	CT	0.05	2.00	mg/l	<b>Cr</b>	16	0.971	550	DW
			0.05	2.00	mg/l	<b>Cr</b>	10	1.31		
			0.11	4.46	mg/l	<b>CrO<sub>4</sub><sup>2-</sup></b>	16	2.17		
			0.11	4.46	mg/l	<b>CrO<sub>4</sub><sup>2-</sup></b>	10	2.92		
<b>Chromium Bath</b>	C)	RT	20	400	g/l	<b>CrO<sub>3</sub></b>	10	556	445	DW
			10	200	g/l	<b>CrO<sub>3</sub></b>	20	278		
			4.0	80.0	g/l	<b>CrO<sub>3</sub></b>	50	111		
<b>COD</b>	1.14560	CT	4.0	40.0	mg/l	<b>COD</b>	16	-41.7	340	OB
			4.0	40.0	mg/l	<b>COD</b>	10	-56.3		
<b>COD</b>	1.01796	CT	5.0	80.0	mg/l	<b>COD</b>	16	-40.7	340	OB
			5.0	80.0	mg/l	<b>COD</b>	10	-54.9		
<b>COD</b>	1.14540	CT	10	150	mg/l	<b>COD</b>	16	-210	445	OB
			10	150	mg/l	<b>COD</b>	10	-284		
<b>COD</b>	1.14895	CT	15	300	mg/l	<b>COD</b>	16	-222	445	OB
			15	300	mg/l	<b>COD</b>	10	-300		
<b>COD</b>	1.14690	CT	50	500	mg/l	<b>COD</b>	16	-397	445	OB
			50	500	mg/l	<b>COD</b>	10	-536		
<b>COD</b>	1.14541	CT	25	1500	mg/l	<b>COD</b>	16	1667	605	OB
			25	1500	mg/l	<b>COD</b>	10	2249		
<b>COD</b>	1.14691	CT	300	3500	mg/l	<b>COD</b>	16	3226	605	OB
			300	3500	mg/l	<b>COD</b>	10	4355		
<b>COD</b>	1.14555	CT	500	10000	mg/l	<b>COD</b>	16	4608	605	OB
			500	10000	mg/l	<b>COD</b>	10	6221		
<b>COD</b>	1.01797	CT	5000	90000	mg/l	<b>COD</b>	16	42553	605	OB
			5000	90000	mg/l	<b>COD</b>	10	57803		
<b>COD (Hg free)</b>	1.09772	CT	10	150	mg/l	<b>COD</b>	16	-238	445	OB
			10	150	mg/l	<b>COD</b>	10	-321		
<b>COD (Hg free)</b>	1.09773	CT	100	1500	mg/l	<b>COD</b>	16	1923	605	OB
			100	1500	mg/l	<b>COD</b>	10	2596		
<b>COD for Seawater</b>	1.17058	CT	5.0	60.0	mg/l	<b>COD</b>	16	-57.5	340	OB
			5.0	60.0	mg/l	<b>COD</b>	10	-77.5		
<b>COD for Seawater</b>	1.17059	CT	50	3000	mg/l	<b>COD</b>	16	3650	605	OB
			50	3000	mg/l	<b>COD</b>	10	4926		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Color	EN ISO 7887	RT	2	500		CU	50	380	410	DW
			0.5	50.0	m <sup>-1</sup>		50	20.0	445	
			0.5	50.0	m <sup>-1</sup>		50	20.0	535	
			0.5	50.0	m <sup>-1</sup>		50	20.0	620	
Color	Color 436	RT	1	250	m <sup>-1</sup>		10	20.0	436	DW
			0.3	125.0	m <sup>-1</sup>		20	10.0		
			0.1	50.0	m <sup>-1</sup>		50	4.00		
Color	Color 525	RT	1	250	m <sup>-1</sup>		10	20.0	525	DW
			0.3	125.0	m <sup>-1</sup>		20	10.0		
			0.1	50.0	m <sup>-1</sup>		50	4.00		
Color	Color 620	RT	1	250	m <sup>-1</sup>		10	20.0	620	DW
			0.3	125.0	m <sup>-1</sup>		20	10.0		
			0.1	50.0	m <sup>-1</sup>		50	4.00		
<b>Color Measurement</b>	see Hazen Color number		<b>Pt/Co or HZ</b>							
Copper	1.14767	RT	0.10	6.00	mg/l	Cu	10	4.44	605	DW
			0.05	3.00	mg/l	Cu	20	2.22		
			0.02	1.20	mg/l	Cu	50	0.889		
Copper	1.14553	CT	0.05	8.00	mg/l	Cu	16	3.60	605	DW
			0.05	8.00	mg/l	Cu	10	4.86		
Copper Bath	C)	RT	10.0	80.0	g/l	Cu	10	43.1	820	DW
			5.0	40.0	g/l	Cu	20	21.6		
			2.0	16.0	g/l	Cu	50	8.62		
Cyanide	1.09701	RT	0.010	0.500	mg/l	CN <sup>-</sup>	10	0.221	605	DW
			0.005	0.2500	mg/l	CN <sup>-</sup>	20	0.110		
			0.002	0.100	mg/l	CN <sup>-</sup>	50	0.0442		
Cyanide	1.14800	RT	0.010	0.500	mg/l	CN <sup>-</sup>	10	0.208	585	DW
			0.005	0.250	mg/l	CN <sup>-</sup>	20	0.104		
			0.002	0.100	mg/l	CN <sup>-</sup>	50	0.0416		
<b>Detergents</b>	see Surfactants									
<b>Dissolved Oxygen</b>	see Oxygen									
<b>Ethanol</b>	see Alcohol									
<b>Fluoride</b>	1.14557	CT	replaced by 1.00809							
Fluoride	1.00809	CT	0.10	1.80	mg/l	F <sup>-</sup>	16	1.43	620	OB
			0.10	1.80	mg/l	F <sup>-</sup>	10	1.93		
			0.025	0.500	mg/l	F <sup>-</sup>	50	0.312		
<b>Fluoride</b>	1.00822.0250	RT	0.02	2.00	mg/l	F <sup>-</sup>	50	A)	605	OB
Fluoride	1.14598	RT	0.10	2.00	mg/l	F <sup>-</sup>	10	2.02	620	OB
			1.0	20.0	mg/l	F <sup>-</sup>	10	21.5		
Formaldehyde	1.14678	RT	0.10	8.00	mg/l	HCHO	10	4.22	565	DW
			0.05	4.00	mg/l	HCHO	20	2.11		
			0.02	1.50	mg/l	HCHO	50	0.844		
Formaldehyde	1.14500	CT	0.10	8.00	mg/l	HCHO	16	3.23	565	DW
			0.10	8.00	mg/l	HCHO	10	4.36		
<b>Gold</b>	1.14821.0002	RT	0.5	12.0	mg/l	Au	10	6.25	550	OB

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 22.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaldrich.com](http://www.sigmaldrich.com).

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank	
			lower limit	upper limit							
<b>Hardness</b>	see Residual Hardness or Total Hardness										
<b>Hazen Color Number</b>			0	500		<b>CU, HZ, Pt or Pt/Co</b>	10	370	340	DW	
			0	250		<b>CU, HZ, Pt or Pt/Co</b>	20	185			
			0	100		<b>CU, HZ, Pt or Pt/Co</b>	50	74			
<b>Hazen Color Number</b>			0	1000		<b>CU, HZ, Pt or Pt/Co</b>	50	813	445	DW	
<b>Hazen Color Number</b>			0	1000		<b>CU, HZ, Pt or Pt/Co</b>	50	752	455	DW	
<b>Hazen Color Number</b>			0	1000		<b>CU, HZ, Pt or Pt/Co</b>	50	775	465	DW	
<b>Hydrazine</b>	1.14797	RT	replaced by 1.09711								
<b>Hydrazine</b>	1.09711	RT	0.02	2.00	mg/l	<b>N<sub>2</sub>H<sub>4</sub></b>	10	0.870	445	DW	
			0.01	1.00	mg/l	<b>N<sub>2</sub>H<sub>4</sub></b>	20	0.435			
			0.005	0.400	mg/l	<b>N<sub>2</sub>H<sub>4</sub></b>	50	0.174			
<b>Hydrogen Peroxide</b>	1.14731	CT	2.0	20.0	mg/l	<b>H<sub>2</sub>O<sub>2</sub></b>	16	38.5	410	DW	
			2.0	20.0	mg/l	<b>H<sub>2</sub>O<sub>2</sub></b>	10	52.3			
			0.25	5.00	mg/l	<b>H<sub>2</sub>O<sub>2</sub></b>	50	10.5			
<b>Hydrogen Peroxide</b>	1.18789	RT	0.03	6.00	mg/l	<b>H<sub>2</sub>O<sub>2</sub></b>	10	2.67	445	OB	
			0.015	3.000	mg/l	<b>H<sub>2</sub>O<sub>2</sub></b>	20	1.34			
<b>Hydrogen Sulfide</b>	see Sulfide										
<b>Hydroquinone</b>	see Oxygen Scavengers										
<b>Iodine</b>	1.00606	RT	0.20	10.00	mg/l	<b>I<sub>2</sub></b>	10	11.9	550	DW	
			0.10	5.00	mg/l	<b>I<sub>2</sub></b>	20	5.95			
			0.050	2.000	mg/l	<b>I<sub>2</sub></b>	50	2.38			
<b>Iodine Color Number</b>			0.05	3.00		<b>IFZ</b>	10	1.27	340	DW	
			0.03	1.50		<b>IFZ</b>	20	0.637			
			0.010	0.600		<b>IFZ</b>	50	0.255			
<b>Iodine Color Number</b>			1.0	50.0		<b>IFZ</b>	10	17.1	445	DW	
			0.5	25.0		<b>IFZ</b>	20	8.55			
			0.2	10.0		<b>IFZ</b>	50	3.42			
<b>Iron</b>	1.14761	RT	0.05	5.00	mg/l	<b>Fe</b>	10	2.08	565	DW	
			0.03	2.50	mg/l	<b>Fe</b>	20	1.04			
			0.005	1.000	mg/l	<b>Fe</b>	50	0.416			
			0.0025	0.5000	mg/l	<b>Fe</b>	100	0.208			
<b>Iron</b>	1.00796	RT	0.10	5.00	mg/l	<b>Fe</b>	10	5.56	500	DW	
			0.05	2.50	mg/l	<b>Fe</b>	20	2.78			
			0.010	1.000	mg/l	<b>Fe</b>	50	1.11			
<b>Iron</b>	1.14549	CT	0.05	4.00	mg/l	<b>Fe</b>	16	1.64	565	DW	
			0.05	5.00	mg/l	<b>Fe</b>	10	2.21			
<b>Iron</b>	1.14896	CT	1.0	50.0	mg/l	<b>Fe</b>	16	28.3	525	DW	
			1.0	50.0	mg/l	<b>Fe</b>	10	38.2			

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Lead	1.09717	RT	0.10	5.00	mg/l	Pb	10	6.25	525	OB
			0.05	2.50	mg/l	Pb	20	3.13		
			1.010	1.000	mg/l	Pb	50	1.25		
<b>Isoascorbic Acid (Erythorbic Acid)</b>	see Oxygen Scavengers									
Lead	1.14833	CT	0.10	5.00	mg/l	Pb	16	4.39	525	OB
			0.10	5.00	mg/l	Pb	10	5.93		
Magnesium	1.00815	CT	5.0	75.0	mg/l	Mg	16	A)	565	DW
			5.0	75.0	mg/l	Mg	10			
Mercury	C)	RT	0.025	1.000	mg/l	Hg	50	0.563	565	OB
Manganese	1.01739	RT	replaced by 1.01846							
Manganese	1.01846	RT	0.05	2.00	mg/l	Mn	10	1.67	565	OB
				1.00	mg/l	Mn	20	0.836		
			0.005	0.400	mg/l	Mn	50	0.334		
Manganese	1.14770	RT	0.50	10.00	mg/l	Mn	10	5.62	445	DW
			0.25	5.00	mg/l	Mn	20	2.81		
			0.01	2.00	mg/l	Mn	50	1.12		
Manganese	1.00816	CT	0.10	5.00	mg/l	Mn	16	4.13	445	DW
			0.10	5.00	mg/l	Mn	10	5.58		
<b>Methylethylketoxime (2-Butanone-etoixime)</b>	see Oxygen Scavengers									
Molybdenum	1.00860	CT	0.02	1.00	mg/l	Mo	16	1.10	620	OB
			0.02	1.00	mg/l	Mo	10	1.49		
			0.03	1.67	mg/l	MoO <sub>4</sub> <sup>2-</sup>	16	1.84		
			0.03	1.67	mg/l	MoO <sub>4</sub> <sup>2-</sup>	10	2.48		
			0.04	2.15	mg/l	Na <sub>2</sub> MoO <sub>4</sub>	16	2.37		
			0.04	2.15	mg/l	Na <sub>2</sub> MoO <sub>4</sub>	10	3.19		
Molybdenum	1.19252	RT	0.5	45.0	mg/l	Mo	20	21.6	410	OB
			0.8	75.0	mg/l	MoO <sub>4</sub> <sup>2-</sup>	20	36.1		
			1.1	96.6	mg/l	Na <sub>2</sub> MoO <sub>4</sub>	200	46.5		
Monochloramine	1.01632	RT	0.25	10.00	mg/l	Cl <sub>2</sub>	10	5.00	690	OB
			0.13	5.00	mg/l	Cl <sub>2</sub>	20	2.50		
			0.050	2.000	mg/l	Cl <sub>2</sub>	50	1.00		
			0.18	7.25	mg/l	NH <sub>2</sub> Cl	10	3.67		
			0.09	3.63	mg/l	NH <sub>2</sub> Cl	20	1.83		
			0.036	1.450	mg/l	NH <sub>2</sub> Cl	50	0.733		
			0.05	1.96	mg/l	NH <sub>2</sub> Cl-N	10	0.988		
			0.03	0.98	mg/l	NH <sub>2</sub> Cl-N	20	0.494		
0.010	0.392	mg/l	NH <sub>2</sub> Cl-N	50	0.198					
Nickel	1.14785	RT	0.10	5.00	mg/l	Ni	10	4.76	445	DW
			0.05	2.50	mg/l	Ni	20	2.38		
			0.02	1.00	mg/l	Ni	50	0.952		
Nickel	1.14554	CT	0.10	6.00	mg/l	Ni	16	3.82	445	OB
			0.10	6.00	mg/l	Ni	10	5.16		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 23.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).



Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Nickel Bath	C)		10	120	g/l	Ni	10	60.6	690	DW
			5.0	60.0	g/l	Ni	20	30.3		
			2.0	24.0	g/l	Ni	50	12.1		
Nitrate	1.09713	RT	1.0	25.0	mg/l	NO <sub>3</sub> -N	10	19.6	340	OB
			0.5	12.5	mg/l	NO <sub>3</sub> -N	20	9.80		
			0.10	5.00	mg/l	NO <sub>3</sub> -N	50	3.92		
			4.4	110.7	mg/l	NO <sub>3</sub> <sup>-</sup>	10	86.8		
			2.2	55.4	mg/l	NO <sub>3</sub> <sup>-</sup>	20	43.4		
			0.4	22.1	mg/l	NO <sub>3</sub> <sup>-</sup>	50	17.4		
Nitrate	1.14773	RT	0.5	20.0	mg/l	NO <sub>3</sub> -N	10	9.62	525	OB
			0.2	10.0	mg/l	NO <sub>3</sub> -N	20	4.81		
			2.2	88.5	mg/l	NO <sub>3</sub> <sup>-</sup>	10	42.6		
			0.9	44.3	mg/l	NO <sub>3</sub> <sup>-</sup>	20	21.3		
Nitrate	1.01842	RT	0.3	30.0	mg/l	NO <sub>3</sub> -N	50	A)	500	DW
			1.3	132.8	mg/l	NO <sub>3</sub> <sup>-</sup>	50			
Nitrate	1.4542	CT	0.5	18.0	mg/l	NO <sub>3</sub> -N	16	7.14	525	OB
			0.5	18.0	mg/l	NO <sub>3</sub> -N	10	9.64		
			2.2	79.7	mg/l	NO <sub>3</sub> <sup>-</sup>	16	31.6		
			2.2	79.7	mg/l	NO <sub>3</sub> <sup>-</sup>	10	42.7		
Nitrate	1.14563	CT	0.5	25.0	mg/l	NO <sub>3</sub> -N	16	14.7	340	OB
			0.5	25.0	mg/l	NO <sub>3</sub> -N	10	19.9		
			2.2	110.7	mg/l	NO <sub>3</sub> <sup>-</sup>	16	65.1		
			2.2	110.7	mg/l	NO <sub>3</sub> <sup>-</sup>	10	87.9		
Nitrate	1.14764	CT	1.0	50.0	mg/l	NO <sub>3</sub> -N	16	27.9	340	OB
			1.0	50.0	mg/l	NO <sub>3</sub> -N	10	37.7		
			4	221	mg/l	NO <sub>3</sub> <sup>-</sup>	16	124		
			4	221	mg/l	NO <sub>3</sub> <sup>-</sup>	10	167		
Nitrate	1.00614	CT	23	225	mg/l	NO <sub>3</sub> -N	16	132	340	OB
			23	225	mg/l	NO <sub>3</sub> -N	10	180		
			102	996	mg/l	NO <sub>3</sub> <sup>-</sup>	16	586		
			102	996	mg/l	NO <sub>3</sub> <sup>-</sup>	10	797		
Nitrate in Seawater	1.14556	CT	0.10	3.00	mg/l	NO <sub>3</sub> -N	16	A)	500	DW
			0.10	2.50	mg/l	NO <sub>3</sub> -N	10			
			0.4	13.3	mg/l	NO <sub>3</sub> <sup>-</sup>	16			
			0.4	11.1	mg/l	NO <sub>3</sub> <sup>-</sup>	10			
Nitrate in Seawater	1.14942	RT	0.2	17.0	mg/l	NO <sub>3</sub> <sup>-</sup>	10	A)	500	DW
			0.9	75.3	mg/l	NO <sub>3</sub> <sup>-</sup>	10			
Nitrite	1.14776	RT	0.02	1.00	mg/l	NO <sub>2</sub> -N	10	0.376	525	DW
			0.010	0.500	mg/l	NO <sub>2</sub> -N	20	0.188		
			0.002	0.200	mg/l	NO <sub>2</sub> -N	50	0.0751		
			0.07	3.28	mg/l	NO <sub>2</sub> <sup>-</sup>	10	1.24		
			0.03	1.64	mg/l	NO <sub>2</sub> <sup>-</sup>	20	0.620		
			0,007	0.657	mg/l	NO <sub>2</sub> <sup>-</sup>	50	0.248		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 24 - 26.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Nitrite	1.14547	CT	0.010	0.700	mg/l	<b>NO<sub>2</sub>-N</b>	16	0.274	525	DW
			0.010	0.700	mg/l	<b>NO<sub>2</sub>-N</b>	10	0.370		
			0.03	2.30	mg/l	<b>NO<sub>2</sub>-N</b>	16	0.900		
			0.03	2.30	mg/l	<b>NO<sub>2</sub><sup>-</sup></b>	10	1.22		
Nitrite	1.00609	CT	1.0	90.0	mg/l	<b>NO<sub>2</sub>-N</b>	16	82.6	605	DW
			1.0	90.0	mg/l	<b>NO<sub>2</sub>-N</b>	10	112.4		
			3.3	295.2	mg/l	<b>NO<sub>2</sub><sup>-</sup></b>	16	271.3		
			3.3	295.2	mg/l	<b>NO<sub>2</sub><sup>-</sup></b>	10	369.2		
Nitrogen (total)	1.00613	CT	0.5	15.0	mg/l	<b>N</b>	16	15.3	340	OB
			0.5	15.0	mg/l	<b>N</b>	10	20.6		
Nitrogen (total)	1.14537	CT	0.5	15.0	mg/l	<b>N</b>	16	7.81	525	OB
			0.5	15.0	mg/l	<b>N</b>	10	10.5		
Nitrogen (total)	1.14763	CT	10	150	mg/l	<b>N</b>	16	154	340	OB
			10	150	mg/l	<b>N</b>	10	208		
<b>Nitrogen, Ammonium</b>	see Ammonium									
<b>Nitrogen, Nitrate</b>	see Nitrate									
<b>Nitrogen, Nitrite</b>	see Nitrite									
<b>Organic Acids, Volatile</b>	see Volatile organic acids									
<b>Organic Carbon, Volatile</b>	see TOC									
Oxygen, dissolved	1.14694	CT	0.5	12.0	mg/l	<b>O<sub>2</sub></b>	16	13.5	500	DW
			0.5	12.0	mg/l	<b>O<sub>2</sub></b>	10	18.2		
Oxygen Scavengers	1.19251	RT	0.020	0.500	mg/l	<b>DEHA</b>	20	0.408	565	OB
			0.027	0.667	mg/l	<b>Carbohy</b>	20	0.544		
			0.053	1.315	mg/l	<b>Hydro</b>	20	1.073		
			0.078	1.950	mg/l	<b>ISA</b>	20	1.592		
			0.087	2.170	mg/l	<b>MEKO</b>	20	1.771		
<b>Oxygen Demand, Biological</b>	see BOD									
<b>Oxygen Demand, Chemical</b>	see COD									
Ozone	1.00607	RT	0.05	4.00	mg/l	<b>O<sub>3</sub></b>	10	2.25	550	DW
			0.02	2.00	mg/l	<b>O<sub>3</sub></b>	20	1.13		
			0.010	0.800	mg/l	<b>O<sub>3</sub></b>	50	0.450		
<b>Ozone</b>	1.14732	RT	replaced by 1.00607							
<b>Palladium</b>	C)	RT	0.05	1.25	mg/l	<b>Pd</b>	10	0.588	525	OB
<b>Peroxide</b>	see Hydrogen Peroxide									
pH	1.01744	CT	6.4	8.8	pH units	<b>pH</b>	16	A)	550	DW
			6.4	8.8	pH units	<b>pH</b>	10			
Phenol	1.00856	RT	0.002	0.100	mg/l	<b>Phenol</b>	20	0.114	445	OB
			0.10	5.00	mg/l	<b>Phenol</b>	10	8.33		
			0.013	2.500	mg/l	<b>Phenol</b>	20	4.17		
			0.025	1.000	mg/l	<b>Phenol</b>	50	1.67		
Phenol	1.14551	CT	0.10	2.50	mg/l	<b>Phenol</b>	16	3.39	500	OB
			0.10	2.50	mg/l	<b>Phenol</b>	10	4.58		

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 27.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Phosphate (PMB)	1.14848	RT	0.05	5.00	mg/l	PO <sub>4</sub> -P	10	2.08	690	OB
			0.03	2.50	mg/l	PO <sub>4</sub> -P	20	1.04		
			0.005	1.000	mg/l	PO <sub>4</sub> -P	50	0.417		
			0.0025	0.5000	mg/l	PO <sub>4</sub> -P	100	0.208		
			0.2	15.3	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	6.38		
			0.09	7.67	mg/l	PO <sub>4</sub> <sup>3-</sup>	20	3.19		
			0.015	3.07	mg/l	PO <sub>4</sub> <sup>3-</sup>	50	1.275		
			0.0077	1.5331	mg/l	PO <sub>4</sub> <sup>3-</sup>	100	0.638		
			0.11	11.46	mg/l	P <sub>2</sub> O <sub>5</sub>	10	4.76		
			0.07	5.73	mg/l	P <sub>2</sub> O <sub>5</sub>	20	2.38		
			0.02	2.29	mg/l	P <sub>2</sub> O <sub>5</sub>	50	0.952		
0.011	1.146	mg/l	P <sub>2</sub> O <sub>5</sub>	100	0.476					
(o)-Phosphate (PMB)	1.00474	CT	0.05	5.00	mg/l	PO <sub>4</sub> -P	16	1.61	690	OB
			0.05	5.00	mg/l	PO <sub>4</sub> -P	10	2.18		
			0.2	15.3	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	4.95		
			0.2	15.3	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	6.68		
			0.11	11.46	mg/l	P <sub>2</sub> O <sub>5</sub>	16	3.70		
0.11	11.46	mg/l	P <sub>2</sub> O <sub>5</sub>	10	4.99					
Phosphate (PMB)	1.14543	CT	0.05	5.00	mg/l	PO <sub>4</sub> -P	16	1.61	690	OB
			0.05	5.00	mg/l	PO <sub>4</sub> -P	10	2.18		
			0.2	15.3	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	4.95		
			0.2	15.3	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	6.68		
			0.11	11.46	mg/l	P <sub>2</sub> O <sub>5</sub>	16	3.70		
0.11	11.46	mg/l	P <sub>2</sub> O <sub>5</sub>	10	4.99					
(o)-Phosphate (PMB)	1.00475	CT	0.5	25.0	mg/l	PO <sub>4</sub> -P	16	8.06	690	OB
			0.5	25.0	mg/l	PO <sub>4</sub> -P	10	10.9		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	24.7		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	33.4		
			1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	16	18.5		
1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	10	24.9					
Phosphate (PMB)	1.14729	CT	0.5	25.0	mg/l	PO <sub>4</sub> -P	16	8.06	690	OB
			0.5	25.0	mg/l	PO <sub>4</sub> -P	10	10.9		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	24.7		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	33.4		
			1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	16	18.5		
1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	10	24.9					
Phosphate (VM)	1.14546	CT	0.5	25.0	mg/l	PO <sub>4</sub> -P	16	13.4	410	OB
			0.5	25.0	mg/l	PO <sub>4</sub> -P	10	18.2		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	41.2		
			1.5	76.7	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	55.6		
			1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	16	30.8		
1.1	57.3	mg/l	P <sub>2</sub> O <sub>5</sub>	10	41.5					
Phosphate (VM)	1.14842	RT	1.0	30.0	mg/l	PO <sub>4</sub> -P	10	18.0	410	OB
			0.5	15.0	mg/l	PO <sub>4</sub> -P	20	9.00		
			3.1	92.0	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	55.2		
			1.5	46.0	mg/l	PO <sub>4</sub> <sup>3-</sup>	20	27.6		
			2.3	68.7	mg/l	P <sub>2</sub> O <sub>5</sub>	10	41.3		
1.1	34.4	mg/l	P <sub>2</sub> O <sub>5</sub>	20	20.6					

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Phosphate (PMB)	1.00798	RT	1.0	100.0	mg/l	PO <sub>4</sub> -P	10	35.1	690	OB
			3	307	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	108		
			2	229	mg/l	P <sub>2</sub> O <sub>5</sub>	10	80.4		
(o)-Phosphate (PMB)	1.00616	CT	3.0	100.0	mg/l	PO <sub>4</sub> -P	16	39.2	690	OB
			3.0	100.0	mg/l	PO <sub>4</sub> -P	10	52.9		
			9	307	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	120		
			9	307	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	162		
			7	229	mg/l	P <sub>2</sub> O <sub>5</sub>	16	89.9		
			7	229	mg/l	P <sub>2</sub> O <sub>5</sub>	10	121		
Phosphate (PMB)	1.00673	CT	3.0	100.0	mg/l	PO <sub>4</sub> -P	16	39.2	690	OB
			3.0	100.0	mg/l	PO <sub>4</sub> -P	10	52.9		
			9	307	mg/l	PO <sub>4</sub> <sup>3-</sup>	16	120		
			9	307	mg/l	PO <sub>4</sub> <sup>3-</sup>	10	162		
			7	229	mg/l	P <sub>2</sub> O <sub>5</sub>	16	89.9		
			7	229	mg/l	P <sub>2</sub> O <sub>5</sub>	10	121		
Platinum	C)	RT	0.10	1.25	mg/l	Pt	10	2.38	690	OB
Platinum-Cobalt Standard	see Hazen Color number		Pt/Co or HZ							
Potassium	1.14562	CT	5.0	50.0	mg/l	K	16	turbidity D)	690	DW
			5.0	50.0	mg/l	K	10			
Potassium	1.00615	CT	30	300	mg/l	K	16	turbidity D)	690	DW
			30	300	mg/l	K	10			
Residual Hardness	1.14683	CT	0.50	5.00	mg/l	Ca	16	A)	565	OB
			1.25	12.5	mg/l	CaCO <sub>3</sub>	16			
			0.70	7.00	mg/l	CaO	16			
			0.070	0.700		°d	16			
			0.088	0.875		°e	16			
			0.125	1.250		°f	16			
			0.50	5.00	mg/l	Ca	10			
			1.25	12.50	mg/l	CaCO <sub>3</sub>	10			
			0.70	7.00	mg/l	CaO	10			
			0.070	0.700		°d	10			
			0.088	0.875		°e	10			
0.125	1.250		°f	10						
Silicate	1.01813	RT	0.5	500.0	µg/l	SiO <sub>2</sub>	50	0.595	820	OB
			0.2	233.7	µg/l	Si	50	0.278		
			0.25	250.00	µg/l	SiO <sub>2</sub>	100	0.2975		
			0.12	116.85	µg/l	Si	100	0.139		
Silicate	1.14794	RT	0.21	10.70	mg/l	SiO <sub>2</sub>	10	7.98	665	DW
			0.11	5.35	mg/l	SiO <sub>2</sub>	20	3.99		
			0.01	1.60	mg/l	SiO <sub>2</sub>	50	0.611	820	
			0.10	5.00	mg/l	Si	10	3.73	665	
			0.05	2.50	mg/l	Si	20	1.87		
			0.005	0.750	mg/l	Si	50	0.286	820	

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 28.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

**D)** Instrument-specific calibration needed. See Appendix page 15.

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank
			lower limit	upper limit						
Silicate	1.00857	RT	1.1	107.0	mg/l	SiO <sub>2</sub>	10	59.8	410	DW
			11	1070	mg/l	SiO <sub>2</sub>	10	602		
			0.5	50	mg/l	Si	10	27.9		
			5	500	mg/l	Si	10	282		
Silver	1.14831	RT	0.50	3.00	mg/l	Ag	10	2.22	550	OB
			0.25	1.50	mg/l	Ag	20	1.11		
Sodium in Nutrient Solutions for Fertilization	1.00885	CT	10	300	mg/l	Na	16	263	550	OB
			10	300	mg/l	Na	10	355		
Sulfate	1.01812	RT	2.5	50.0	mg/l	SO <sub>4</sub> <sup>2-</sup>	10	turbidity D)	445	SB
			1.3	25.0	mg/l	SO <sub>4</sub> <sup>2-</sup>	20			
			0.50	10.00	mg/l	SO <sub>4</sub> <sup>2-</sup>	50			
Sulfate	1.02532	CT	1.0	50.0	mg/l	SO <sub>4</sub> <sup>2-</sup>	16	turbidity D)	445	SB
			1.0	50.0	mg/l	SO <sub>4</sub> <sup>2-</sup>	10			
Sulfate	1.14548	CT	5	250	mg/l	SO <sub>4</sub> <sup>2-</sup>	16	turbidity D)	525	SB
			5	250	mg/l	SO <sub>4</sub> <sup>2-</sup>	10			
Sulfate	1.02537	RT	5	300	mg/l	SO <sub>4</sub> <sup>2-</sup>	10	turbidity D)	525	SB
Sulfate	1.14791	RT	25	300	mg/l	SO <sub>4</sub> <sup>2-</sup>	10	256	525	OB
Sulfate	1.00617	CT	50	500	mg/l	SO <sub>4</sub> <sup>2-</sup>	16	turbidity D)	525	SB
			50	500	mg/l	SO <sub>4</sub> <sup>2-</sup>	10			
Sulfate	1.14564	CT	100	1000	mg/l	SO <sub>4</sub> <sup>2-</sup>	16	turbidity D)	820	SB
			100	1000	mg/l	SO <sub>4</sub> <sup>2-</sup>	10			
Sulfide	1.14779	RT	0.10	1.50	mg/l	S <sup>2-</sup>	10	A)	665	DW
			0.020	0.500	mg/l	S <sup>2-</sup>	50	0.244		
Sulfite	1.14394	CT	1.0	20.0	mg/l	SO <sub>3</sub> <sup>2-</sup>	16	8.77	410	OB
			1.0	20.0	mg/l	SO <sub>3</sub> <sup>2-</sup>	10	11.8		
			0.05	3.00 B)	mg/l	SO <sub>3</sub> <sup>2-</sup>	50	1.69		
Sulfite	1.01746	RT	1.0	60.0	mg/l	SO <sub>3</sub> <sup>2-</sup>	10	29.4	410	OB
			0.8	48.0	mg/l	SO <sub>2</sub>	10	23.5		
Surfactants (anionic)	1.14697	CT	replaced by 1.02552							
Surfactants (anionic)	1.02552	CT	0.05	2.00	mg/l	SDSA	16	1.85	653	OB
			0.06	2.56	mg/l	SDBS	16	2.368		
			0.05	2.12	mg/l	SDS)	16	1.96		
			0.08	3.26	mg/l	SDOSSA	16	3.016		
Surfactants (cationic)	1.01764	CT	0.05	1.50	mg/l	CTAB	16	1.92	620	OB
Surfactants (non-ionic)	1.01787	CT	0.10	7.50	mg/l	Triton X-100	16	6.06	605	OB
Suspended Solids	C)	RT	25	750	mg/l	SuS	20	turbidity D)	820	DW
Tensides	see Surfactants									
Tin	1.14622	CT	0.10	2.50	mg/l	Sn	16	A)	665	DW
			0.10	2.50	mg/l	Sn	10			
TOC	1.14878	CT	5.0	80.0	mg/l	TOC	16	-64.5	605	OB
TOC	1.14879	CT	50	800	mg/l	TOC	16	-645	605	OB

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**SB** Sample blank - clear sample without reagent (turbid samples must be filtered)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 29 and 30.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

**D)** Instrument-specific calibration needed. See Appendix page 15.

Parameter	Order No.	Test Type	Measuring range		Unit	Chemical Form	Cell size used [mm]	Factor	Wave-length [nm]	Blank	
			lower limit	upper limit							
<b>Total Alkalinity</b>	see Acid capacity to pH 4.3										
<b>Total Hardness</b>	1.00961	CT	5	215	mg/l	<b>Ca</b>	16	A)	565	OB	
			13	538	mg/l	<b>CaCO<sub>3</sub></b>	16				
			7	301	mg/l	<b>CaO</b>	16				
			0.7	30.1		<b>°d</b>	16				
			0.9	37.6		<b>°e</b>	16				
			1.3	53.8		<b>°f</b>	16				
			5	215	mg/l	<b>Ca</b>	10				
			13	538	mg/l	<b>CaCO<sub>3</sub></b>	10				
			7	301	mg/l	<b>CaO</b>	10				
			0.7	30.1		<b>°d</b>	10				
			0.9	37.6		<b>°e</b>	10				
			1.3	53.8		<b>°f</b>	10				
<b>Total Nitrogen</b>	see Nitrogen (total)										
<b>Turbidity</b>	C)	RT	1	100		<b>FAU</b>	50	turbidity D)	550	DW	
<b>Volatile Organic Acids</b>	1.01763	CT	replaced by 1.01749 or 1.01809								
<b>Volatile Organic Acids</b>	1.01749	CT	50	3000	mg/l	<b>HOAc</b>	16	1841	500	OB	
			50	3000	mg/l	<b>HOAc</b>	10	2486			
			73	4401	mg/l	<b>Butyric Acid</b>	16	2701			
			73	4401	mg/l	<b>Butyric Acid</b>	10	3648			
<b>Volatile Organic Acids</b>	1.01809	CT	50	3000	mg/l	<b>HOAc</b>	16	1841	500	OB	
			50	3000	mg/l	<b>HOAc</b>	10	2486			
			73	4401	mg/l	<b>Butyric Acid</b>	16	2701			
			73	4401	mg/l	<b>Butyric Acid</b>	10	3648			
<b>Water Hardness</b>	see Residual Hardness or Total Hardness										
<b>Zinc</b>	1.00861	CT	0.025	1.000	mg/l	<b>Zn</b>	16	1.36	500	OB	
			0.025	1.000	mg/l	<b>Zn</b>	10	1.84			
<b>Zinc</b>	1.14832	RT	0.05	2.50	mg/l	<b>Zn</b>	10	1.08	565	DW	
<b>Zinc</b>	1.14566	CT	0.20	5.00	mg/l	<b>Zn</b>	16	4.88	500	OB	
			0.20	5.00	mg/l	<b>Zn</b>	10	6.59			

**DW** Distilled water (without reagents, poured into the type of cell used)

**OB** Own blank (distilled water and all reagents in the same quantity as used for the measuring sample preparation. Separately prepared in standard test tubes and poured into the type of cell used)

**A)** For programming data (non-linear calibration and absorption-concentration-table) see Appendix page 31.

**C)** No ready-to-use kit. Find detailed information in our application list on [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

**D)** Instrument-specific calibration needed. See Appendix page 15.

## Appendix

### A) Non-linear Calibration and Absorption-Concentration-Table

Calibration curves for the methods are non-linear.

1. Use the mentioned concentration-absorption-tables (from page 16)
2. Besides using the concentration-absorption-table you can enter a Non-linear Curve by using the coefficients of the following formula.

$$C = a + bx + cx^2 + dx^3$$

Check your instrument and enter the coefficients according the given list. The calibration is always done against distilled water.

We recommend taking a standard and checking if the calibration is done correctly because also spectrophotometers have small differences from instrument to instrument.

### B) Handling Details

Each test kit contains a package insert with detailed information regarding the standard procedure of the measurement. In some cases, however, special points have to be considered which are not mentioned in the package inserts.

In this appendix you will find specific applications and modified methods for analyses for sensitive measurements indicated with a B).

### C) Alternative Methods

There are no test kits available for this parameter. The methods used there are reported in analytical literature. Applications and instructions how to perform the methods are available on the Internet homepage of Merck KGaA, Darmstadt, Germany: [www.sigmaaldrich.com](http://www.sigmaaldrich.com).

### D) Turbidity Measurement

The following parameters are methods where light attenuation by turbidity is measured. As the optical system of every spectrophotometer is different, we convince you to determine the factor for your spectrophotometer by your own and program it in your photometer.

Parameter	Order No.
Cyanuric Acid	1.19250
Potassium	1.14562
Potassium	1.00615
Sulfate	1.14548
Sulfate	1.00617
Sulfate	1.14564
Sulfate	1.01812
Sulfate	1.02532
Sulfate	1.02537
Suspended Solids	physical measurement - application
Turbidity	physical measurement - application

### Acid Capacity Cell Test (Ord. No. 1.01758)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mmol/l OH <sup>-</sup>	mg/l CaCO <sub>3</sub> <sup>-</sup>
0.458	0	0
0.487	0.40	20
0.518	1.00	50
0.575	1.90	95
0.656	2.80	140
0.720	3.70	185
0.786	4.50	225
0.834	5.40	270
0.908	6.30	315
0.970	7.20	360
1.022	8.00	400

Absorption 10-mm Cell	mmol/l OH <sup>-</sup>	mg/l CaCO <sub>3</sub> <sup>-</sup>
0.337	0	0
0.358	0.40	20
0.381	1.00	50
0.422	1.90	95
0.482	2.80	140
0.529	3.70	185
0.577	4.50	225
0.613	5.40	270
0.667	6.30	315
0.713	7.20	360
0.751	8.00	400

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	16-mm Round Cell	10-mm Cell	10-mm Cell
	0.40 – 8.00 mmol/l OH <sup>-</sup>	20 – 400mg/l CaCO <sub>3</sub> <sup>-</sup>	0.40 – 8.00 mmol/l OH <sup>-</sup>	20 – 400mg/l CaCO <sub>3</sub> <sup>-</sup>
coefficient a:	-10.0739891	-503.6995	-10.073989	-503.6995
coefficient b:	30.6808597	1534.043	41.7426662	2087.1333
coefficient c:	-23.7583112	-1187.9156	-43.9785482	-2198.9274
coefficient d:	10.8174802	540.874	27.2435746	1362.1787



### Aluminium Test (Ord. No. 1.14825)

Absorption-Concentration-Table, calibration against distilled water

Absorption 10-mm Cell	mg/l Al
0.200	0
0.250	0.05
0.290	0.10
0.360	0.15
0.430	0.20
0.590	0.30
0.750	0.40
1165	0.60
1560	0.80
1935	1.00
2285	1.20

Absorption 50-mm Cell	mg/l Al
1.050	0
1.100	0.020
1.180	0.040
1.300	0.060
1.420	0.080
1.550	0.100
1.670	0.120
1.800	0.140
1.930	0.160
2.060	0.180
2.200	0.200

Non-linear Curve, calibration against distilled water

Non-linear Calibration	10-mm Cell	50-mm Cell
	0.10 – 1.20 mg/l Al	0.020 – 0.240 mg/l Al
Coefficient a:	-0.167	-0.493
Coefficient b:	0.981	0.769
Coefficient c:	-0.378	-0.348
Coefficient d:	0.092	0.065

### Aluminium Cell Test (Ord. No. 1.00594)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Al
0.336	0
0.397	0.05
0.466	0.10
0.569	0.15
0.671	0.20
0.781	0.25
0.897	0.30
1032	0.35
1164	0.40
1288	0.45
1411	0.50

Absorption 10-mm Cell	mg/l Al
0.245	0
0.290	0.05
0.340	0.10
0.415	0.15
0.490	0.20
0.570	0.25
0.655	0.30
0.753	0.35
0.850	0.40
0.940	0.45
1030	0.50

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	10-mm Cell
	0.02 – 0.50 mg/l Al	0.02 – 0.50 mg/l Al
Coefficient a:	-0.308	-0.308
Coefficient b:	1.157	1.585
Coefficient c:	-0.748	-1.403
Coefficient d:	0.237	0.609

### Calcium Cell Test (Ord. No. 1.00858)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO
0.075	0	0	0
0.100	10	25	14
0.170	35	88	49
0.245	60	150	84
0.330	85	213	119
0.450	115	288	161
0.575	145	363	203
0.705	175	438	245
0.835	200	500	280
0.950	225	563	315
1.075	250	625	350

Absorption 10-mm Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO
0.056	0	0	0
0.074	10	25	14
0.126	35	88	49
0.181	60	150	84
0.244	85	213	119
0.333	115	288	161
0.426	145	363	203
0.522	175	438	245
0.619	200	500	280
0.704	225	563	315
0.796	250	625	350

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell
	10 – 250 mg/l Ca	25 – 625 mg/l CaCO <sub>3</sub>	14 – 350 mg/l CaO
coefficient a:	-29.293	-73,418	-41.011
coefficient b:	416.85	1.045	583.59
coefficient c:	-252.27	-634.44	-353.18
coefficient d:	99.158	249.09	138.82

Non-linear Calibration	10-mm Cell	10-mm Cell	10-mm Cell
	10 – 250 mg/l Ca	25 – 625 mg/l CaCO <sub>3</sub>	14 – 350 mg/l CaO
coefficient a:	-29.666	-74.353	-41.533
coefficient b:	567.59	1422.9	794.63
coefficient c:	-473.01	-1189.5	-662.22
coefficient d:	253.87	637.66	355.42

### Chloride Test (Ord. No. 1.01807)

Absorption-Concentration-Table, calibration against distilled water

Absorption 50-mm Cell	mg/l Cl <sup>-</sup>
0.000	0
0.016	0.10
0.058	0.30
0.192	0.90
0.327	1.50
0.465	2.10
0.607	2.70
0.739	3.30
0.865	3.90
0.987	4.50
1.078	5.00

Non-linear Curve, calibration against distilled water

Non-linear Calibration	50-mm Cell
	0.10-5.00 mg/l Cl <sup>-</sup>
A0	0.01337
A1	4.873
A2	-1.329
A3	1.0176
E0	-0.003

### Chloride Cell Test (Ord. No. 1.01804)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Cl <sup>-</sup>
0.127	0
0.149	0.5
0.263	2.0
0.377	3.5
0.497	5.0
0.603	6.5
0.709	8.0
0.795	9.5
0.900	11.0
1.014	13.0
1.116	15.0

Absorption 10-mm Cell	mg/l Cl <sup>-</sup>
0.094	0
0.110	0.5
0.194	2.0
0.279	3.5
0.368	5.0
0.447	6.5
0.525	8.0
0.589	9.5
0.666	11.0
0.751	13.0
0.827	15.0

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	10-mm Cell
	0.5-15.0 mg/l Cl <sup>-</sup>	0.5-15.0 mg/l Cl <sup>-</sup>
A0	-2.978	-2.978
A1	31.49	42.51
A2	-75.94	-138.4
A3	137.4	338.1
A4	-112.0	-371.9
A5	34.71	155.6
E0	0.124	0.092

## Fluoride Test (Ord. No. 1.00822.0250)

Absorption-Concentration-Table, calibration against distilled water

Absorption 50-mm Cell	mg/l F <sup>-</sup>
0.000	0
-0.018	0.02
-0.155	0.25
-0.307	0.50
-0.458	0.75
-0.605	1.00
-0.730	1.20
-0.842	1.40
-0.950	1.60
-1.054	1.80
-1.141	2.00

Non-linear Curve, calibration against distilled water

Non-linear Calibration	50-mm Cell
	0.02 – 2.00 mg/l F <sup>-</sup>
coefficient a:	-0.00378
coefficient b:	-1.6093
coefficient c:	0.1432
coefficient d:	0.0724
coefficient e:	-0.2252
coefficient f:	-0.2426

### Magnesium Cell Test (Ord. No. 1.00815)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Mg
0.070	0
0.085	5.0
0.120	13.0
0.150	20.0
0.190	28.0
0.235	36.0
0.285	44.0
0.335	52.0
0.385	59.0
0.435	67.0
0.490	75.0

Absorption 10-mm Cell	mg/l Mg
0.052	0
0.063	5.0
0.089	13.0
0.111	20.0
0.147	28.0
0.174	36.0
0.211	44.0
0.248	52.0
0.285	59.0
0.322	67.0
0.363	75.0

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	10-mm Cell
	5.0 – 75.0 mg/l Mg	5.0 – 75.0 mg/l Mg
coefficient a:	-20.79	-19.51
coefficient b:	337.41	425.65
coefficient c:	-513.33	-778.18
coefficient d:	458.21	892.38

### Nitrate Test (Ord. No. 1.01842)

Absorption-Concentration-Table, calibration against distilled water

Absorption 50-mm Cell	mg/l NO <sub>3</sub> -N	mg/l NO <sub>3</sub> <sup>-</sup>
0.028	0	0
0.034	0.3	43891
0.089	3.0	43903
0.188	6.0	44008
0.324	9.0	39.8
0.492	12.0	53.1
0.852	15.0	66.4
1004	18.0	79.7
1422	22.0	97.4
1666	26.0	115.1
1925	30.0	132.8

Non-linear Curve, calibration against distilled water

Non-linear Calibration	50-mm Cell	50-mm Cell
	0.3 – 30.0 mg/l NO <sub>3</sub> -N	1.3 – 132.8 mg/l NO <sub>3</sub> <sup>-</sup>
A0	-1.184	-5.243
A1	48.66	215.4
A2	-65.75	-291.1
A3	51.43	227.7
A4	-18.48	-81.79
A5	2.568	11.37
E0	0.029	0.128



## Nitrate Cell Test in seawater (Ord. No. 1.14556)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l NO <sub>3</sub> -N	mg/l NO <sub>3</sub> <sup>-</sup>
0.000	0	0
0.085	0.10	0.4
0.260	0.40	1.8
0.480	0.70	3.1
0.725	1.00	4.4
1.000	1.30	5.8
1.275	1.60	7.1
1.600	1.90	8.4
1.900	2.20	9.7
2.200	2.50	11.1
2.500	2.80	12.4
2.700	3.00	13.3

Absorption 10-mm Cell	mg/l NO <sub>3</sub> -N	mg/l NO <sub>3</sub> <sup>-</sup>
0.000	0	0
0.063	0.10	0.4
0.193	0.40	1.8
0.356	0.70	3.1
0.537	1.00	4.4
0.741	1.30	5.8
0.944	1.60	7.1
1.185	1.90	8.4
1.407	2.20	9.7
1.630	2.50	11.1
1.852	2.80	12.4
2.000	3.00	13.3

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	16-mm Round Cell	10-mm Cell	10-mm Cell
	0.10 – 3.00 mg/l NO <sub>3</sub> -N	0.4 – 13.3 mg/l NO <sub>3</sub> <sup>-</sup>	0.10 – 3.00 mg/l NO <sub>3</sub> -N	0.4 – 13.3 mg/l NO <sub>3</sub> <sup>-</sup>
coefficient a:	-0.01	-0.0442	-0.0102	-0.0454
coefficient b:	1.6224	7.182	2.1895	9.6924
coefficient c:	-0.3722	-1.6478	-0.6766	-2.9951
coefficient d:	0.0687	0.3041	0.1683	0.7449

### Nitrate Test in seawater (Ord. No. 1.14942)

Absorption-Concentration-Table, calibration against distilled water

Absorption 10-mm Cell	mg/l NO <sub>3</sub> -N	mg/l NO <sub>3</sub> <sup>-</sup>
0.000	0.0	0
0.050	1.0	4.43
0.160	2.0	8.85
0.300	3.0	13.28
0.580	5.0	22.13
0.860	7.0	30.99
1.140	9.0	39.84
1.410	11.0	48.69
1.700	13.0	57.55
1.980	15.0	66.40
2.350	17.0	75.26

Non-linear Curve, calibration against distilled water

Non-linear Calibration	10-mm Cell	10-mm Cell
	0.2 – 17.0 mg/l NO <sub>3</sub> -N	0.9 – 75.3 mg/l NO <sub>3</sub> <sup>-</sup>
coefficient a:	0.421	-1865
coefficient b:	8251	36.524
coefficient c:	-0.5679	-2515
coefficient d:	0.0335	0.149

### pH Cell Test (Ord. No. 1.01744)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	pH
0.000	6.2
0.100	6.4
0.175	6.7
0.330	7.0
0.500	7.2
0.600	7.4
0.800	7.6
1.020	7.8
1.325	8.0
1.700	8.4
1.900	8.8

Absorption 10-mm Cell	pH
0.000	6.2
0.074	6.4
0.130	6.7
0.244	7.0
0.370	7.2
0.444	7.4
0.593	7.6
0.741	7.8
0.981	8.0
1.259	8.4
1.407	8.8

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	10-mm Cell
	pH 6.4 – 8.8	pH 6.4 – 8.8
coefficient a:	6.144	6141
coefficient b:	3.218	4.359
coefficient c:	-2.318	-4.231
coefficient d:	0.714	1.755

## Residual Hardness Cell Test (Ord. No. 1.14683)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO	°d	°e	°f
0.100	0	0	0	0	0	0
0.220	0.50	1.25	0.70	0.070	0.088	0.125
0.350	1.00	2.50	1.40	0.140	0.175	0.250
0.470	1.50	3.75	2.10	0.210	0.263	0.375
0.600	2.00	5.00	2.80	0.280	0.350	0.500
0.750	2.50	6.25	3.50	0.350	0.438	0.625
0.900	3.00	7.50	4.20	0.420	0.525	0.750
1.200	4.00	10.00	5.60	0.560	0.700	1.000
1.500	5.00	12.50	7.00	0.700	0.875	1.250

Absorption 10-mm Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO	°d	°e	°f
0.074	0	0	0	0	0	0
0.163	0.50	1.25	0.70	0.070	0.088	0.125
0.259	1.00	2.50	1.40	0.140	0.175	0.250
0.348	1.50	3.75	2.10	0.210	0.263	0.375
0.444	2.00	5.00	2.80	0.280	0.350	0.500
0.556	2.50	6.25	3.50	0.350	0.438	0.625
0.667	3.00	7.50	4.20	0.420	0.525	0.750
0.889	4.00	10.00	5.60	0.560	0.700	1.000
1.111	5.00	12.50	7.00	0.700	0.875	1.250

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell
	0.50 – 5.00 mg/l Ca	1.25 – 12.50 mg/l CaCO <sub>3</sub>	0.70 – 7.00 mg/l CaO	0.070 – 0.700 °d	0.088 – 0.875 °e	0.125 – 1.250 °f
coefficient a:	-0.46153	-11538	-0.64615	-0.06461	-0.08077	-0.11538
coefficient b:	4.62293	11.557	6.4721	0.64721	0.80901	1.15573
coefficient c:	-1.14084	-2.8521	-1.59717	-0.15972	-0.19965	-0.28521
coefficient d:	0.32358	0.8089	0.45301	0.0453	0.05663	0.08089

Non-linear Calibration	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell
	0.50 – 5.00 mg/l Ca	1.25 – 12.50 mg/l CaCO <sub>3</sub>	0.70 – 7.00 mg/l CaO	0.070 – 0.700 °d	0.088 – 0.875 °e	0.125 – 1.250 °f
coefficient a:	-0.46099	-115246	-0.64538	-0.06454	-0.08067	-0.11525
coefficient b:	623776	155.944	873286	0.87329	109.161	155944
coefficient c:	-20739	-518475	-290346	-29035	-0.36293	-0.51847
coefficient d:	0.79354	198386	111096	0.1111	0.13887	0.19839

### Sulfide Test (Ord. No. 1.14779)

Absorption-Concentration-Table, calibration against distilled water

Absorption 10-mm Cell	mg/l S <sup>2-</sup>
0.000	0
0.080	0.10
0.220	0.25
0.350	0.40
0.490	0.55
0.600	0.70
0.770	0.90
0.890	1.05
1.080	1.35
1.200	1.50

Non-linear Curve, calibration against distilled water

Non-linear Calibration	10-mm Cell
	0.10 – 1.50 mg/l S <sup>2-</sup>
coefficient a:	0.0052
coefficient b:	1.1079
coefficient c:	-0.0055
coefficient d:	0.1062

**Tin Cell Test (Ord. No. 1.14622)**

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Sn
0.000	0
0.040	0.10
0.230	0.40
0.500	0.70
0.780	1.00
0.980	1.20
1.190	1.40
1.370	1.60
1.650	1.90
1.900	2.20
2.150	2.50

Absorption 10-mm Cell	mg/l Sn
0.000	0
0.030	0.10
0.170	0.40
0.370	0.70
0.578	1.00
0.726	1.20
0.881	1.40
1.015	1.60
1.222	1.90
1.407	2.20
1.593	2.50

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	10-mm Cell
	0.10 – 2.50 mg/l Sn	0.10 – 2.50 mg/l Sn
coefficient a:	0.03	0.03
coefficient b:	1.5544	2.0985
coefficient c:	-0.5016	-0.9141
coefficient d:	0.147	0.3617

### Total Hardness Cell Test (Ord. No. 1.00961)

Absorption-Concentration-Table, calibration against distilled water

Absorption 16-mm Round Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO	°d	°e	°f
0.068	0	0	0	0	0	0
0.088	5	13	7	0.7	0.9	1.3
0.150	25	63	35	3.5	4.4	6.3
0.240	50	125	70	7.0	8.8	12.5
0.345	75	188	105	10.5	13.1	18.8
0.465	100	250	140	14.0	17.5	25.0
0.570	120	300	168	16.8	21.0	30.0
0.710	145	363	203	20.3	25.4	36.3
0.855	170	425	238	23.8	29.8	42.5
1015	195	488	273	27.3	34.1	48.8
1145	215	538	301	30.1	37.6	53.8

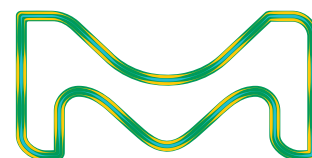
Absorption 10-mm Cell	mg/l Ca	mg/l CaCO <sub>3</sub>	mg/l CaO	°d	°e	°f
0.050	0	0	0	0	0	0
0.065	5	13	7	0.7	0.9	1.3
0.111	25	63	35	3.5	4.4	6.3
0.178	50	125	70	7.0	8.8	12.5
0.256	75	188	105	10.5	13.1	18.8
0.344	100	250	140	14.0	17.5	25.0
0.422	120	300	168	16.8	21.0	30.0
0.526	145	363	203	20.3	25.4	36.3
0.633	170	425	238	23.8	29.8	42.5
0.752	195	488	273	27.3	34.1	48.8
0.848	215	538	301	30.1	37.6	53.8

Non-linear Curve, calibration against distilled water

Non-linear Calibration	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell	16-mm Round Cell
	5 – 215 mg/l Ca	13 – 538 mg/l CaCO <sub>3</sub>	7 – 301 mg/l CaO	0.7 – 30.1 °d	0.9 – 37.6 °e	1.3 – 53.8 °f
coefficient a:	-22.354	-55.594	-31.296	-31.296	-38.748	-55.594
coefficient b:	339.98	849.94	475.97	47.597	59.261	84.994
coefficient c:	-195.26	-489.08	-273.36	-27.336	-33.641	-48.908
coefficient d:	69.671	175.17	97.54	9.754	11.864	17.517

Non-linear Calibration	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell	10-mm Cell
	5 – 215 mg/l Ca	13 – 538 mg/l CaCO <sub>3</sub>	7 – 301 mg/l CaO	0.7 – 30.1 °d	0.9 – 37.6 °e	1.3 – 53.8 °f
coefficient a:	-22.177	-55.151	-31.048	-31.048	-3.844	-55.151
coefficient b:	457.29	1143.2	640.2	640.2	79.71	114.32
coefficient c:	-351.63	-880.8	-492.29	-49.229	-60.575	-88.08
coefficient d:	168.46	423.59	235.85	23.585	28.674	42.359

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