Supelco®
Analytical Products

Analytical Procedures Appendices

Spectroquant® Prove Spectrophotometer 600 plus
1.73028

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Analytical Procedures and Appendices

Contents

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I Available photometric test kits and methods

The following methods with the corresponding method numbers are programmed into the photometer and measurements can be made without any further adjustments. Method selection is achieved through a barcode on the cell (for cell tests) or through a barcode on the AutoSelector (for reagent tests).
The method number listed in column 1 is for manual selection. The total range relates to the cited test in column 2 and, in the reagent tests, covers all possible path length (cells from 10 to 100 mm).
At the end of this chapter there are the tables for the pre-programmed AQA1 and PipeCheck methods.

Method number	Determination		Total range	Method
2537	Acesulfame-K EN 1377		0.0 – 1200.0 mg/g	UV absorption
208	Acid Capacity Cell Test to pH 4.3 (total alkalinity)	1.01758	0.40 – 8.00 mmol/l	Indicator reaction
2518	ADMI Color Measurement [6]		2.0 – 100.0	Inherent color
2517	ADMI Color Measurement [6]		10 – 500	Inherent color
2516	ADMI Color Measurement [6]		10 – 1000	Transmittances from 400 - 700 nm
2612	α Acids [2]		0 – 80 mg/l	Inherent color
2637	α Acids (Hop Extracts) [2]		0.0 - 100.0%	Inherent color
2636	α/β Acids (Hops) [2]		0.0 - 100.0%	Inherent color
196	Aluminium Cell Test [1]	1.00594	0.02 – 0.50 mg/l Al	Chromazurole S
43	Aluminium Test [1]	1.14825	0.020 – 1.20 mg/l Al	Chromazurole S
	Amino nitrogen, free - see Free Amino Nitrogen			
2520	Ammonia, free		0.00 – 3.65 mg/l NH_3	as ammonium
104	Ammonium Cell Test	1.14739	0.010 – 2.000 mg/l NH_4-N	Indophenol blue
51	Ammonium Cell Test	1.14558	0.20 – 8.00 mg/l NH_4-N	Indophenol blue
52	Ammonium Cell Test	1.14544	0.5 – 16.0 mg/l NH_4-N	Indophenol blue
53	Ammonium Cell Test	1.14559	4.0 – 80.0 mg/l NH_4-N	Indophenol blue
54	Ammonium Test	1.14752	0.010 – 3.00 mg/l NH_4-N	Indophenol blue
155	Ammonium Test	1.00683	2.0 – 75.0 mg/l NH_4-N	Indophenol blue
163	Ammonium Test	1.00683	5 – 150 mg/l NH_4-N	Indophenol blue
2587	Anisidine value [5]		0.0 – 200.0 AV	Measurement at 350 nm
2601	Anthocyanogenes [2]		0 – 100 mg/l	Acidic hydrolysis
130	Antimony in water and wastewater		0.10 – 8.00 mg/l Sb	Brilliant green
2540	Annatto Cheese §64 LFGB 03.00-37		0.0 – 10.0 mg/kg	Bixin / Norbixin

[1] turbidity correction possible
[2] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[5] the analytical procedure for this method is given in the manual of the "Methods for color measurement"
[6] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
156	AOX Cell Test[1]	1.00675	0.05 – 2.50 mg/l AOX	Oxidation to chloride
132	Arsenic Test[1]	1.01747	0.001 – 0.100 mg/l As	Ag-DDTC
2562	ASTM Color Measurement		0.5 - 8.0	Inherent color
2603	Bitterness - beer[2]		1.0 – 80.0 BU	UV absorption
2604	Bitterness - wort[2]		1.0 – 120.0 BU	UV absorption
157	BOD Cell Test[1]	1.00687	0.5 – 3000 mg/l BOD	Modification of Winkler method
164	Boron Cell Test[1]	1.00826	0.05 – 2.00 mg/l B	Azomethine H
46	Boron Test[1]	1.14839	0.050 – 0.800 mg/l B	Rosocyanine
307	Bromate in water and drinking water - Ultra Low Range		0.5 – 40.0 µg/l BrO_3	3,3'-Dimethylnaphthidine
308	Bromate in water and drinking water - Low Range		2.5 – 200.0 µg/l BrO_3	3,3'-Dimethylnaphthidine
146	Bromine[4] Test[1]	1.00605	0.020 – 10.00 mg/l Br_2	S-DPD
67	Cadmium Cell Test	1.14834	0.025 – 1.000 mg/l Cd	Cadion derivate
183	Cadmium Test	1.01745	0.0020 – 0.500 mg/l Cd	Cadion derivate
165	Calcium Cell Test[1]	1.00858	10 – 250 mg/l Ca	Phthalein purple
42	Calcium Test[1]	1.14815	5 – 160 mg/l Ca	Glyoxal-bis-hydroxyanil
125	Calcium Test sensitive[1]	1.14815	1.0 – 15.0 mg/l Ca	Glyoxal-bis-hydroxyanil
304	Calcium Test[3]	1.00049	0.20 – 4.00 mg/l Ca	Phthalein derivate
	Carbohydrates, total - see Total Carbohydrates			
2523	Carotene (palm oil)		10 – 7500 mg/kg	Inherent color
313	Cell Density (OD600)		-0.020 – 1.200	Measurement at 600 nm
	Cell Density - see McFarland or Cell Density (OD600)			
95	Chloride Cell Test[1]	1.14730	5 – 125 mg/l Cl	Iron(III)-thiocyanat
110	Chloride Test[1]	1.14897	2.5 – 25.0 mg/l Cl	Iron(III)-thiocyanat
63	Chloride Test[1]	1.14897	10 – 250 mg/l Cl	Iron(III)-thiocyanat
218	Chloride Cell Test[1]	1.01804	0.5 – 15.0 mg/l Cl	Iron(III)-thiocyanat
219	Chloride Test[1]	1.01807	0.10 – 5.00 mg/l Cl	Iron(III)-thiocyanat
141	Chlorine Cell Test[1] (free chlorine)	1.00595	0.03 – 6.00 mg/l Cl_2	S-DPD
142	Chlorine Cell Test[1] (free chlorine + total chlorine)	1.00597	0.03 – 6.00 mg/l Cl_2	S-DPD
143	Chlorine Test[1] (free chlorine)	1.00598	0.010 – 6.00 mg/l Cl_2	S-DPD

[1] turbidity correction possible
[3] individual calibration necessary
[4] can also be determined with Spectroquant® Chlorine Test, Cat. No. 1.00598 (see corresponding application notes on www.sigmaaldrich.com)

Method number	Determination		Total range	Method
145	Chlorine Test[1] (total chlorine)	1.00602	0.010 – 6.00 mg/l Cl_2	S-DPD
144	Chlorine Test[1] (free chlorine + total chlorine)	1.00599	0.010 – 6.00 mg/l Cl_2	S-DPD
194	Chlorine Cell Test[1] (free chlorine + total chlorine)	1.00086/1.00087/ 1.00088/1.00089	0.03 – 6.00 mg/l Cl_2	DPD
306	Chlorine Test[1] (free chlorine + total chlorine)	1.00086/1.00087/ 1.00088	0.010 – 1.000 mg/l Cl_2	DPD
149	Chlorine Dioxide Test[1]	1.00608	0.020 – 10.00 mg/l ClO_2	S-DPD
2509	Chlorophyll-a (DIN/ISO)		result in µg/l Chl-a or Phaeo	Inherent color
2504	Chlorophyll-a (APHA/ASTM)		result in mg/m³ Chl-a or Phaeo	Inherent color
2507	Chlorophyll-a, -b, -c (APHA/ASTM)		result in mg/m³ Chl-a, -b, -c	Inherent color
39	Chromate Cell Test[1]	1.14552	0.05 – 2.00 mg/l Cr	Diphenylcarbazide
39	Chromate Cell Test[1] (total chromium)	1.14552	0.05 – 2.00 mg/l Cr	Peroxodisulfate oxidation / Diphenylcarbazide
40	Chromate Test[1]	1.14758	0.010 – 3.00 mg/l Cr	Diphenylcarbazide
20	Chromium Baths		4.0 – 400 g/l CrO_3	Inherent color
2584	CIE color distance[5]		ΔE*ab 0.00 – 200.00 ΔL* -200.00 – 200.00 Δa* -200.00 – 200.00 Δb* -200.00 – 200.00 ΔC*ab -200.00 – 200.00	Comparative measure-ment of transmittances from 360 - 780 nm
2580	CIELAB color space (brightness, chroma)[5]		ΔE*ab 0.00 – 200.00 ΔL* -200.00 – 200.00 Δa* -200.00 – 200.00 Δb* -200.00 – 200.00 ΔC*ab -200.00 – 200.00	Comparative measure-ment of transmittances from 360 - 780 nm
2581	CIELUV color space[5]		L* 0.00 – 105.00 u* -180.0 – 180.0 v* -180.0 – 180.0 C*uv 0.00 – 300.00 S*uv 0.000 – 200.000	Transmittances from 360 – 780 nm
2582	CIExyY color space[5]		x 0.0000 – 0.8000 y 0.0000 – 0.8000 Y 0.000 – 200.000	Transmittances from 360 – 780 nm
232	Cobalt Cell Test[1]	1.17244	0.05 – 2.00 mg/l Co	Nitroso-R salt
305	Cobalt in water		0.5 – 10.0 mg/l Co	Nitroso-R salt

[1] turbidity correction possible
[5] the analytical procedure for this method is given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
31	COD Cell Test [1)]	1.14560	4.0 – 40.0 mg/l COD	Chromosulfuric acid oxidation / chromate determination
211	COD Cell Test [1)]	1.01796	5.0 – 80.0 mg/l COD	Chromosulfuric acid oxidation / chromate determination
14	COD Cell Test [1)]	1.14540	10 – 150 mg/l COD	Chromosulfuric acid oxidation / chromate determination
105	COD Cell Test [1)]	1.14895	15 – 300 mg/l COD	Chromosulfuric acid oxidation / chromate determination
93	COD Cell Test [1)]	1.14690	50 – 500 mg/l COD	Chromosulfuric acid oxidation / chromate determination
23	COD Cell Test [1)]	1.14541	25 – 1500 mg/l COD	Chromosulfuric acid oxidation / chromium(III) determination
94	COD Cell Test [1)]	1.14691	300 – 3500 mg/l COD	Chromosulfuric acid oxidation / chromium(III) determination
24	COD Cell Test [1)]	1.14555	500 – 10000 mg/l COD	Chromosulfuric acid oxidation / chromium(III) determination
209	COD Cell Test [1)]	1.01797	5000 – 90000 mg/l COD	Chromosulfuric acid oxidation / chromium(III) determination
137	COD Cell Test (Hg free) [1)]	1.09772	10 – 150 mg/l COD	Chromosulfuric acid oxidation / chromate determination
138	COD Cell Test (Hg free) [1)]	1.09773	100 – 1500 mg/l COD	Chromosulfuric acid oxidation / chromium(III) determination
220	COD Cell Test for seawater [1)]	1.17058	5.0 – 60.0 mg/l COD	Chloride depletion / chromosulfuric acid oxidation / chromate determination
221	COD Cell Test for seawater [1)]	1.17059	50 – 3000 mg/l COD	Chloride depletion / chromosulfuric acid oxidation / chromium(III) determination
15	Color α(436) (spectral absorptions coefficient) [6)]		0.1 – 250 m^{-1}	Measurement at 436 nm

[1)] turbidity correction possible
[6)] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
61	Color α(525) (spectral absorptions coefficient) [6]		0.1 – 250 m^{-1}	Measurement at 525 nm
78	Color α(620) (spectral absorptions coefficient) [6]		0.1 – 250 m^{-1}	Measurement at 620 nm
303	Color (410) (EN 7887) [6]		2 – 2500 mg/l Pt	Measurement at 410 nm
2633	Color - ASBC [2), 5)]		0.0 – 50.0 °SRM 0.0 – 100.0 EBC Units	Absorption at 430 nm
2602	Color - EBC [2), 5)]		0.0 – 60.0 EBC Units	Absorption at 430 nm
32	Color Hazen [1), 6)]		0.2 – 500 mg/l Pt/Co (Hazen)	Platinum-cobalt-Standard Method, measurement at 340 nm
179	Color Hazen [1), 6)]		0 – 1000 mg/l Pt/Co (Hazen)	Platinum-cobalt-Standard Method, measurement at 445 nm
180	Color Hazen [1), 6)]		0 – 1000 mg/l Pt/Co (Hazen)	Platinum-cobalt-Standard Method, measurement at 455 nm
181	Color Hazen [1), 6)]		0 – 1000 mg/l Pt/Co (Hazen)	Platinum-cobalt-Standard Method, measurement at 465 nm
2588	Color α(436), α(525), and α(620) [5)]		0.0 – 250.0 m^{-1}	Absorption at 436, 525, and 620 nm
	Color of sugar solutions - see ICUMSA Color			
2613	Copper - EBC [2)]		0.10 – 5.00 mg/l Cu	Cuprethol
26	Copper Cell Test [1)]	1.14553	0.05 – 8.00 mg/l Cu	Cuprizone
27	Copper Test [1)]	1.14767	0.02 – 6.00 mg/l Cu	Cuprizone
83	Copper Baths		2.0 – 80.0 g/l Cu	Inherent color
228	Cyanide Cell Test [1)] (free cyanide)	1.02531	0.010 – 0.500 mg/l CN	Barbituric acid + pyridinecarboxylic acid
75	Cyanide Cell Test [1)] (free cyanide)	1.14561	0.010 – 0.500 mg/l CN	Barbituric acid + pyridinecarboxylic acid
75	Cyanide Cell Test [1)] (readily liberated cyanide)	1.14561	0.010 – 0.500 mg/l CN	Citric acid / barbituric acid + pyridinecarboxylic acid
109	Cyanide Test [1)] (free cyanide)	1.09701	0.0020 – 0.500 mg/l CN	Barbituric acid + pyridinecarboxylic acid
109	Cyanide Test [1)] (readily liberated cyanide)	1.09701	0.0020 – 0.500 mg/l CN	Citric acid / barbituric acid + pyridinecarboxylic acid

[1)] turbidity correction possible
[2)] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[5)] the analytical procedure for this method is given in the manual of the "Methods for color measurement"
[6)] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
210	Cyanuric Acid Test	1.19253	2 – 160 mg/l Cyan Acid	Triazine derivative
2528	delta K268 (olive oil)		-0.10 – 1.00	UV absorption
2529	delta K270 (olive oil)		-0.10 – 1.00	UV absorption
2631	Diacetyl (ASBC) [2)]		0.00 – 4.00 mg/l Diacetyl	a-Naphthol
	Diacetyl (EBC) - see Vicinal Diketones			
2524	DOBI (palm oil)		0.00 – 4.00	UV absorption
2512	dsDNA		5 – 37500 µg/ml dsDNA	UV absorption
2626	Flavanoids [2)]		3 – 200 mg/l	4-Dimethylaminocinnam-aldehyde
2635	Flocculation (ASBC) [2)]		0.0 - 100.0%	Turbidity
215	Fluoride Cell Test [1)]	1.00809	0.10 – 1.80 mg/l F	Alizarin complexone
216	Fluoride Cell Test sensitive	1.00809	0.025 – 0.500 mg/l F	Alizarin complexone
234	Fluoride Cell Test	1.17243	0.10 – 2.50 mg/l F	SPADNS (As free)
166	Fluoride Test [1)]	1.14598	0.10 – 2.00 mg/l F	Alizarin complexone
167	Fluoride Test [1)]	1.14598	1.0 – 20.0 mg/l F	Alizarin complexone
217	Fluoride Test	1.00822	0.02 – 2.00 mg/l F	SPADNS
233	Fluoride Test	1.17236	0.02 – 2.00 mg/l F	SPADNS (As free)
28	Formaldehyde Cell Test [1)]	1.14500	0.10 – 8.00 mg/l HCHO	Chromotropic acid
91	Formaldehyde Test [1)]	1.14678	0.02 – 8.00 mg/l HCHO	Chromotropic acid
2606	Free Amino Nitrogen beer / wort [2)]		0 – 400 mg/l	Ninhydrin
2561	Gardner Color Measurement [6)]		1.0 - 18.0 Gardner	Transmittances from 360 – 780 nm
45	Gold Test	1.14821	0.5 – 12.0 mg/l Au	Rhodamine B
	Hardness - see Total Hardness or Residual Hardness			
	Hazen - see Color Hazen			
2586	Hess-Ives color scale [5)]		0.0 – 400 H-I	Absorption at 460, 470, 560, and 640 nm
2634	Hop Storage Index (HSI) [2)]		0.00 – 2.00 HSI	UV absorption
2585	Hunter color distance [5)]		ΔE*H 0.00 – 200.00 ΔL* -200.00 – 200.00 Δa* -200.00 – 200.00 Δb* -200.00 – 200.00	Transmittances from 360 – 780 nm
2583	HunterLab color space [5)]		L* 0.00 – 105.00 a* -180.0 – 180.0 b* -180.0 – 180.0	Transmittances from 360 – 780 nm

[1)] turbidity correction possible
[2)] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[5)] the analytical procedure for this method is given in the manual of the "Methods for color measurement"
[6)] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
44	Hydrazine Test[1]	1.09711	0.005 – 2.00 mg/l N_2H_4	4-Dimethylaminobenz-aldehyde
99	Hydrogen Peroxide Cell Test[1]	1.14731	2.0 – 20.0 mg/l H_2O_2	Titanyl sulfate
128	Hydrogen Peroxide Cell Test sensitive[1]	1.14731	0.25 – 5.00 mg/l H_2O_2	Titanyl sulfate
198	Hydrogen Peroxide Test	1.18789	0.015 – 6.00 mg/l H_2O_2	Phenanthroline derivative
2538	Hydroxyproline Meat §64 LFGB 06.00-8		0.000 – 1.000 g/100 g	4-Dimethylaminobenz-aldehyde
2548	ICUMSA Color GS1/3-7 (2011)[6]		0 – 50 000 $IU_{7.0}$	Absorption at 420 nm
2549	ICUMSA Color GS2/3-9 (2005)[6]		0 – 600 $IU_{7.0}$	Absorption at 420 nm
2550	ICUMSA Color GS2/3-10 (2011)[6]		0 – 50 $IU_{7.0}$	Absorption at 420 nm
2551	ICUMSA Color GS9/1/2/3-8 (2011)[6]		0 – 20 000 $IU_{7.0}$	Absorption at 420 nm
147	Iodine[4] Test[1]	1.00606	0.050 – 10.00 mg/l I_2	S-DPD
2615	Iodine Value, photometric[2]		0.00 – 0.80	Iodine
2616	Iodine Value, photometric[2]		0.00 – 0.80	Iodine
33	Iodine Color Number[6]		0.010 – 3.00	Measurement at 340 nm
21	Iodine Color Number[6]		0.2 – 50.0	Measurement at 445 nm
2642	Iron - ASBC[2]		0.00 – 3.00 mg/l Fe	1,10-Phenanthroline
2643	Iron - ASBC[2]		0.00 – 3.00 mg/l Fe	2,2'-Bipyridine
2644	Iron - ASBC[2]		0.00 – 0.40 mg/l Fe	Triazine (ferrozine)
2623	Iron - EBC[2]		0.000 – 1.000 mg/l Fe	Triazine
2624	Iron - EBC[2]		0.000 – 0.800 mg/l Fe	Triazine
37	Iron Cell Test	1.14549	0.05 – 4.00 mg/l Fe	Triazine
106	Iron Cell Test[1]	1.14896	1.0 – 50.0 mg/l Fe (Fe(II) and Fe(III))	2,2'-Bipyridine
38	Iron Test	1.14761	0.0025 – 5.00 mg/l Fe	Triazine
161	Iron Test[1]	1.00796	0.010 – 5.00 mg/l Fe (Fe(II) and Fe(III))	1,10-Phenanthroline
2611	Iso-α Acids[2]		0 – 60	UV absorption
2525	K232 (olive oil)		0.00 – 4.00	UV absorption
2526	K268 (olive oil)		0.00 – 4.00	UV absorption
2527	K270 (olive oil)		0.00 – 4.00	UV absorption
311	Klett color index[5]		0 – 1000 Klett417	Absorption at 417 nm

[1] turbidity correction possible
[2] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[4] can also be determined with Spectroquant® Chlorine Test, Cat. No. 1.00598 (see corresponding application notes on www.sigmaaldrich.com)
[5] the analytical procedure for this method is given in the manual of the "Methods for color measurement"
[6] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
66	Lead Cell Test[1)]	1.14833	0.10 – 5.00 mg/l Pb	PAR
160	Lead Test[1)]	1.09717	0.010 – 5.00 mg/l Pb	PAR
158	Magnesium Cell Test[1)]	1.00815	5.0 – 75.0 mg/l Mg	Phthalein purple
159	Manganese Cell Test[1)]	1.00816	0.10 – 5.00 mg/l Mn	Formaldoxime
19	Manganese Test[1)]	1.14770	0.010 – 10.00 mg/l Mn	Formaldoxime
226	Manganese Test[1)]	1.01846	0.005 – 2.00 mg/l Mn	PAN
2513	McFarland		0.0 – 10.0	Cell density, turbidimetric
135	Mercury in water and wastewater		0.025 – 1.000 mg/l Hg	Michler's ketone
175	Molybdenum Cell Test	1.00860	0.02 – 1.00 mg/l Mo	Brompyrogallol red
206	Molybdenum Test	1.19252	0.5 – 45.00 mg/l Mo	Mercaptoacetic acid
185	Monochloramine Test	1.01632	0.050 – 10.00 mg/l Cl_2	Indophenol blue
2614	Nickel - EBC[2)]		0.00 – 5.00 mg/l Ni	Dimethylglyoxime
17	Nickel Cell Test[1)]	1.14554	0.10 – 6.00 mg/l Ni	Dimethylglyoxime
18	Nickel Test[1)]	1.14785	0.02 – 5.00 mg/l Ni	Dimethylglyoxime
57	Nickel Bath		2.0 – 120 g/l Ni	Inherent color
59	Nitrate Cell Test[1)]	1.14542	0.5 – 18.0 mg/l NO_3-N	Nitrospectral
30	Nitrate Cell Test[1)]	1.14563	0.5 – 25.0 mg/l NO_3-N	2,6-Dimethylphenol
107	Nitrate Cell Test[1)]	1.14764	1.0 – 50.0 mg/l NO_3-N	2,6-Dimethylphenol
151	Nitrate Cell Test[1)]	1.00614	23 – 225 mg/l NO_3-N	2,6-Dimethylphenol
60	Nitrate Test[1)]	1.14773	0.20 – 20.0 mg/l NO_3-N	Nitrospectral
139	Nitrate Test[1)]	1.09713	0.10 – 25.0 mg/l NO_3-N	2,6-Dimethylphenol
72	Nitrate Cell Test in seawater[1)]	1.14556	0.10 – 3.00 mg/l NO_3-N	Resorcine
140	Nitrate Test in seawater[1)]	1.14942	0.2 – 17.0 mg/l NO_3-N	Resorcine
227	Nitrate Test	1.01842	0.3 – 30.0 mg/l NO_3-N	Reduction / Benzoic acid derivative
2503	Nitrate (UV)		0.0 – 7.0 mg/l NO_3-N	Direct measurement in the UV range
35	Nitrite Cell Test[1)]	1.14547	0.010 – 0.700 mg/l NO_2-N	Griess reaction
197	Nitrite Cell Test[1)]	1.00609	1.0 – 90.0 mg/l NO_2-N	Iron(II)-ethylenediammonium sulfate
36	Nitrite Test[1)]	1.14776	0.002 – 1.00 mg/l NO_2-N	Griess reaction
68	Nitrogen (total) Cell Test	1.14537	0.5 – 15.0 mg/l N	Peroxodisulfate oxidation / Nitrospectral
153	Nitrogen (total) Cell Test	1.00613	0.5 – 15.0 mg/l N	Peroxodisulfate oxidation / 2,6-Dimethylphenol

[1)] turbidity correction possible
[2)] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"

Method number	Determination		Total range	Method
108	Nitrogen (total) Cell Test	1.14763	10 – 150 mg/l N	Peroxodisulfate oxidation / 2,6-Dimethylphenol
	OD280 - see Protein (OD280)			
	OD600 - see Cell Density (OD600)			
	Oils - see K (olive oil), delta K (olive oil), Carotene (palm oil) or DOBI (palm oil)			
92	Oxygen Cell Test[1)]	1.14694	0.5 – 12.0 mg/l O_2	Modification of Winkler method
207	Oxygen Scavengers Test	1.19251	0.020 – 0.500 mg/l DEHA	FerroZine®
148	Ozone Test[1)]	1.00607	0.010 – 4.00 mg/l O_3	S-DPD
133	Palladium in water and wastewater		0.05 – 1.25 mg/l Pd	Thio-Michler's ketone
	2,3-Pentandion - see Vicinal Diketones			
186	pH Cell Test	1.01744	6.4 – 8.8	Phenol red
	Phaeophytin (DIN/ISO) / (APHA/ASTM) - see Chlorophyll-a (DIN/ISO) or (APHA/ASTM)			
73	Phenol Cell Test[1)]	1.14551	0.10 – 2.50 mg/l C_6H_5OH	MBTH
176	Phenol Test[1)]	1.00856	0.025 – 5.00 mg/l C_6H_5OH	Aminoantipyrine
177	Phenol Test[1)]	1.00856	0.002 – 0.100 mg/l C_6H_5OH	Aminoantipyrine by extraction
	Phenols, steam-volatile - see steam-volatile Phenols			
212	Phosphate Cell Test	1.00474	0.05 – 5.00 mg/l PO_4-P	Phosphormolybdenum blue
55	Phosphate Cell Test	1.14543	0.05 – 5.00 mg/l PO_4-P	Phosphormolybdenum blue
55	Phosphate Cell Test (total phosphorus)	1.14543	0.05 – 5.00 mg/l P	Peroxodisulfate oxidation / phosphormolybdenum blue
213	Phosphate Cell Test	1.00475	0.5 – 25.0 mg/l PO_4-P	Phosphormolybdenum blue
86	Phosphate Cell Test	1.14729	0.5 – 25.0 mg/l PO_4-P	Phosphormolybdenum blue
86	Phosphate Cell Test (total phosphorus)	1.14729	0.5 – 25.0 mg/l P	Peroxodisulfate oxidation / phosphormolybdenum blue
152	Phosphate Cell Test	1.00616	3.0 – 100.0 mg/l PO_4-P	Phosphormolybdenum blue
214	Phosphate Cell Test	1.00673	3.0 – 100.0 mg/l PO_4-P	Phosphormolybdenum blue
214	Phosphate Cell Test (total phosphorus)	1.00673	3.0 – 100.0 mg/l P	Peroxodisulfate oxidation / phosphormolybdenum blue
56	Phosphate Test	1.14848	0.0025 – 5.00 mg/l PO_4-P	Phosphormolybdenum blue
162	Phosphate Test	1.00798	1.0 – 100.0 mg/l PO_4-P	Phosphormolybdenum blue
69	Phosphate Cell Test[1)]	1.14546	0.5 – 25.0 mg/l PO_4-P	Vanadatomolybdate

[1)] turbidity correction possible

Method number	Determination		Total range	Method
70	Phosphate Test[1)]	1.14842	0.5 – 30.0 mg/l PO_4-P	Vanadatomolybdate
2535	Phosphatide Milk §64 LFGB 01.00-41		0 – 750 mg/100 g P	Ashing / phosphor-molybdenum blue
2534	Phosphorus Juice EN 1136		0.0 – 300.0 mg/l P	Phosphormolybdenum blue
2533	Phosphorus Meat §64 LFGB 06.00-9		0.000 – 2.500 g/100 g P_2O_5	Ashing / vanadato-molybdate
2532	Phosphorus Milk §64 LFGB 01.00-92		0 – 2000 mg/100 g P	Ashing / phosphor-molybdenum blue
	Photometric iodine test - see Iodine Test, photometric			
	Pigment, yellow - see Yellow Pigment			
134	Platinum in water and waste-water		0.10 – 1.25 mg/l Pt	o-Phenylendiamine
103	Potassium Cell Test	1.14562	5.0 – 50.0 mg/l K	Kalignost®, turbidimetric
150	Potassium Cell Test	1.00615	30 – 300 mg/l K	Kalignost®, turbidimetric
2539	Proline Juice EN 1141		0 – 1200 mg/l	Ninhydrin
319	Protein BCA[3)]		200 – 1000 µg/l BSA	Bicinchoninic acid (BCA)
2640	Protein Beer, dark[2)]		0.00 – 100.00% (wt/wt)	UV absorption
2639	Protein Beer, stabilized[2)]		0.00 – 100.00% (wt/wt)	UV absorption
2638	Protein Beer, unstabilized[2)]		0.00 – 100.00% (wt/wt)	UV absorption
315	Protein Biuret Low Range[3)]		0.5 – 5.0 g/l BSA	Biuret reaction
316	Protein Biuret High Range[3)]		1 – 10 g/l BSA	Biuret reaction
312	Protein (OD280)		-0.020 – 2.000	Measurement at 280 nm
2641	Protein Wort[2)]		0.00 – 100.00% (malt/db)	UV absorption
2617	Reducing Power[2)]		0 – 100%	DPI
2632	Reducing Sugars[2)]		0.00 – 1.00 g/l Dextrose	PAHBAH
98	Residual Hardness Cell Test[1)]	1.14683	0.50 – 5.00 mg/l Ca	Phthalein purple
2510	RNA		4 – 30000 µg/ml RNA	UV absorption
2536	Saccharine EN 1376		0.0 – 1200.0 mg/g	UV absorption
2563	Saybolt Color Measurement[6)]		-15 - 30 Saybolt	Transmittances from 380 – 780 nm
2564	Saybolt Color Measurement[6)]		-15 - 30 Saybolt	Transmittances from 380 – 780 nm
79	Silicate (Silicic acid) Test	1.14794	0.11 – 10.70 mg/l SiO_2	Silicomolybdenum blue
81	Silicate (Silicic acid) Test	1.14794	0.011 – 1.600 mg/l SiO_2	Silicomolybdenum blue
169	Silicate (Silicic acid) Test[1)]	1.00857	1.1 – 107.0 mg/l SiO_2	Molybdatosilicate

[1)] turbidity correction possible
[2)] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[3)] individual calibration necessary

Method number	Determination		Total range	Method
171	Silicate (Silicic acid) Test [1)]	1.00857	11 – 1070 mg/l SiO_2	Molybdatosilicate
225	Silicate (Silicic acid) Test	1.01813	0.25 – 500.0 µg/l SiO_2	Silicomolybdenum blue
47	Silver Test [1)]	1.14831	0.25 – 3.00 mg/l Ag	Eosine / 1,10-Phenanthro-line
168	Sodium Cell Test in nutrient solutions [1)]	1.00885	10 – 300 mg/l Na	indirectly as chloride
300	Spectral Absorption Coefficient α(254) [6)]		0.1 – 250 m^{-1}	Measurement at 254 nm
302	Spectral Absorption Coefficient α(436) [6)]		0.1 – 250 m^{-1}	Measurement at 436 nm
301	Spectral Attenuation Coefficient µ(254) [6)]		0.1 – 250 m^{-1}	Measurement at 254 nm
2571	Spectral Attenuation Coefficient µ(254), corrected [5)]		0.0 – 250 m^{-1}	Absorption at 254 and 550 nm
2511	ssDNA		3 – 25000 µg/ml ssDNA	UV absorption
2621	Steam-volatile Phenols - malt [2)]		0.00 – 3.00 mg/kg	Aminoantipyrine by extraction
2621	Steam-volatile Phenols - beer [2)]		0.00 – 0.30 mg/kg	Aminoantipyrine by extraction
2622	Steam-volatile Phenols - malt [2)]		0.00 – 3.00 mg/kg	Aminoantipyrine by extraction
2622	Steam-volatile Phenols - beer [2)]		0.00 – 0.30 mg/kg	Aminoantipyrine by extraction
314	Sugars [3)]		0 – 200 g/l	3,5-Dinitrosalicylic acid (DNSA)
	Sugar solutions, Color of - see ICUMSA Color			
229	Sulfate Cell Test	1.02532	1.0 – 50.0 mg/l SO_4	Bariumsulfate, turbidi-metric
64	Sulfate Cell Test	1.14548	5 – 250 mg/l SO_4	Bariumsulfate, turbidi-metric
154	Sulfate Cell Test	1.00617	50 – 500 mg/l SO_4	Bariumsulfate, turbidi-metric
82	Sulfate Cell Test	1.14564	100 – 1000 mg/l SO_4	Bariumsulfate, turbidi-metric
65	Sulfate Test [1)]	1.14791	25 – 300 mg/l SO_4	Tannin

[1)] turbidity correction possible
[2)] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove"
[3)] individual calibration necessary
[6)] the analytical procedure for this method is also given in the manual of the "Methods for color measurement"

Method number	Determination		Total range	Method
224	Sulfate Test	1.01812	0.50 – 50.0 mg/l SO_4	Bariumsulfate, turbidimetric
230	Sulfate Test [7]	1.02537	5 – 300 mg/l SO_4	Bariumsulfate, turbidimetric
236	Sulfate Test [7]	1.02537	5 – 300 mg/l SO_4	Bariumsulfate, turbidimetric
80	Sulfide Test [1]	1.14779	0.020 – 1.50 mg/l S	Dimethyl-p-phenylendiamin
71	Sulfite Cell Test [1]	1.14394	1.0 – 20.0 mg/l SO_3	Ellman's reagent
127	Sulfite Cell Test sensitive [1]	1.14394	0.05 – 3.00 mg/l SO_3	Ellman's reagent
187	Sulfite Test [1]	1.01746	1.0 – 60.0 mg/l SO_3	Ellman's reagent
231	Surfactants (anionic) Cell Test	1.02552	0.05 – 2.00 mg/l SDAS	Methylene blue
192	Surfactants (cationic) Cell Test [1]	1.01764	0.05 – 1.50 mg/l k-Ten	Disulfine blue
193	Surfactants (nonionic) Cell Test [1]	1.01787	0.10 – 7.50 mg/l n-Ten	TBPE
182	Suspended Solids		1 – 750 mg/l SusS	
2619	Thiobarbituric Acid Number [2]		0 – 250	Thiobarbituric acid
100	Tin Cell Test [1]	1.14622	0.10 – 2.50 mg/l Sn	Pyrocatechol violet
235	Tin Cell Test [1]	1.17265	0.10 – 2.50 mg/l Sn	Pyrocatechol violet
2577	Tint index [5]		-6.00 – 3.00 TI_{10mm}	Transmittances from 360 – 780 nm
2578	Tint index [5]		-6.00 – 3.00 TI_{10mm}	Transmittances from 360 – 780 nm
172	TOC Cell Test	1.14878	5.0 – 80.0 mg/l TOC	Peroxodisulfate oxidation / Indicator
173	TOC Cell Test	1.14879	50 – 800 mg/l TOC	Peroxodisulfate oxidation / Indicator
2625	Total Carbohydrates [2]		0.000 – 6.000 g/100 ml	Anthrone
178	Total Hardness Cell Test [1]	1.00961	5 – 215 mg/l Ca	Phthalein purple
2610	Total Polyphenols [2]		1 – 800 mg/l	Iron(III)
2579	Transmittances T_x, T_y, T_z [5]		T_x 0.0 – 150.0 T_y 0.0 – 150.0 T_z 0.0 – 150.0	Transmittances from 380 – 780 nm
77	Turbidity		1 – 100 FAU	Measurement at 550 nm
309	UV-absorbing organic matter [5]		0.0000 – 1.000 A/cm 0.0000 – 1.000 cm^{-1} 0.00 – 100 mm^{-1}	Absorption at 254 nm

[1] turbidity correction possible
[2] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[5] the analytical procedure for this method is given in the manual of the "Methods for color measurement"
[7] **only when selecting the method manually:**
for batches with a minimum shelf life **till** 2021/10/31: select method number **230**
for batches with a minimum shelf life **after** 2021/10/31: select method number **236**

Method number	Determination		Total range	Method
310	UV-absorbing organic matter (UV absorption 254 nm) [5]		0.0000 – 3.000 A/cm 0.0000 – 3.000 cm^{-1} 0.00 – 300.0 m^{-1}	Absorption at 254 nm
310	UV irradiation (UV absorption 254 nm) [5]		0.0000 – 3.000 A/cm 0.0000 – 3.000 cm^{-1} 0.00 – 300.0 m^{-1}	Absorption at 254 nm
2572	UV transmission 254 nm [5]		0.00 – 105.00%T/cm	Transmission at 254 nm
2620	Vicinal Diketones [2]		0.000 – 2.000 mg/kg	Phenylendiamin
222	Volatile Organic Acids Cell Test [1]	1.01749	50 – 3000 mg/l CH_3COOH	Esterification
223	Volatile Organic Acids Test [1]	1.01809	50 – 3000 mg/l CH_3COOH	Esterification
	Water hardness - see Total Hardness or Residual Hardness			
2575	Whiteness [5]		40.0 – 220.0 WI_{10mm}	Transmittances from 380 – 780 nm
2576	Whiteness [5]		40.0 – 220.0 WI_{50mm}	Transmittances from 380 – 780 nm
2541	Yellow Pigment EN ISO 11052		0.000 – 1.250 mg/100 g	ß-Carotene
2573	Yellowness [5]		0.0 – 30.0 YI_{10mm}	Transmittances from 380 – 780 nm
2574	Yellowness [5]		0.0 – 90.0 YI_{50mm}	Transmittances from 380 – 780 nm
174	Zinc Cell Test	1.00861	0.025 – 1.000 mg/l Zn	PAR
74	Zinc Cell Test	1.14566	0.20 – 5.00 mg/l Zn	PAR
41	Zinc Test [1]	1.14832	0.05 – 2.50 mg/l Zn	Cl-PAN

[1] turbidity correction possible
[2] the analytical procedure for this method is given in the manual of the "Brewery Methods Prove plus"
[5] the analytical procedure for this method is given in the manual of the "Methods for color measurement"

Pre-programmed AQA1 and PipeCheck methods

AQA1

Method number	Name	Cat. No.	Method	Content
9002	Certipur® UV-VIS Standard 1	1.08160.0001	Photometric accuracy	Potassium dichromate solution
9003	Certipur® UV-VIS Standard 1a	1.04660.0001	Photometric accuracy	Potassium dichromate solution
9005	Certipur® UV-VIS Standard 2	1.08161.0001	Stray light	Sodium nitrite solution
9008	Certipur® UV-VIS Standard 3	1.08163.0001	Stray light	Sodium iodide solution
9009	Certipur® UV-VIS Standard 4	1.08164.0001	Stray light	Potassium chloride solution
9007	Certipur® UV-VIS Standard 5	1.08165.0001	Spectral resolution	Toluene solution in n-hexane
9004	Certipur® UV-VIS Standard 6	1.08166.0001	Wavelength accuracy	Holmium oxide solution
9001	Spectroquant® PhotoCheck	1.14693.0001	Photometric accuracy	Color solutions

PipeCheck

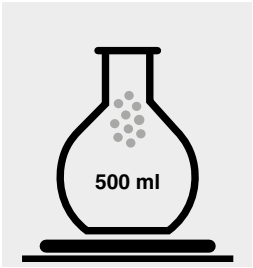
Method number	Name	Cat. No.	Pipette volume	Content
9012	Spectroquant® PipeCheck	1.14692.0001	2.0 ml	Check and reference solution
9013	Spectroquant® PipeCheck	1.14692.0001	3.0 ml	Check and reference solution
9014	Spectroquant® PipeCheck	1.14692.0001	5.0 ml	Check and reference solution
9015	Spectroquant® PipeCheck	1.14692.0001	10.0 ml	Check and reference solution

Acesulfame K
in table-top sweeteners

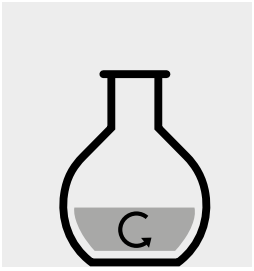
corresponds to **EN 1377** and **German Food and Feed Code §64 LFGB 57.22.99-3**

Application

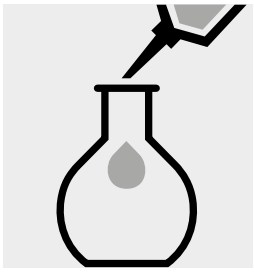
Measuring range:	0.0 – 1200.0 mg/g	10-mm quartz cell	Method No. 2537
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This zero value remains valid until the method is exited.		



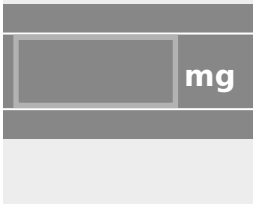
Weigh pulverized sample into a 500-ml volumetric flask, accurately weighed to 0.1 mg.



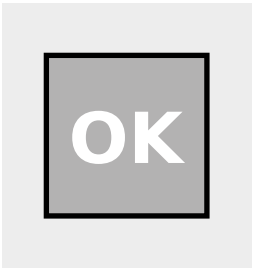
Dissolve, filter, and dilute sample acc. to EN 1377 [1] resp. §64 LFGB 57.22.99-3 [2].



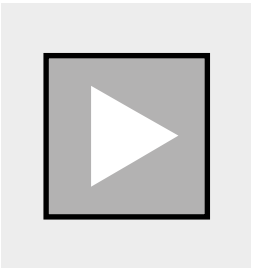
Select method no. **2537**. Perform the zero adjustment and confirm by pressing the <OK> button.



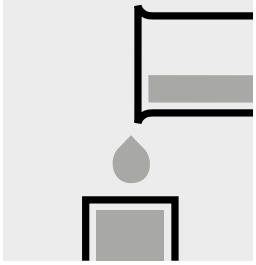
Enter the sample weight in milligrams.



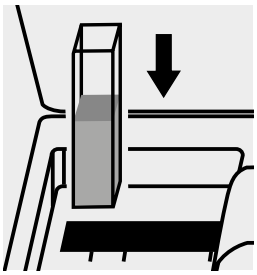
Confirm with <OK>.



Tap the <Start> button.

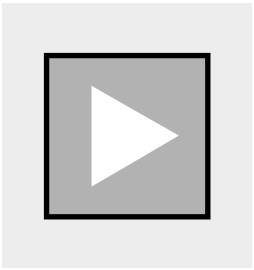


Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

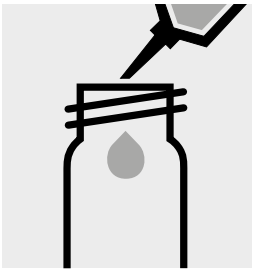
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Acid Capacity to pH 4.3 (Total Alkalinity)

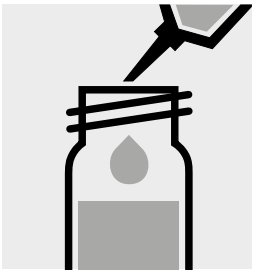
1.01758

Cell Test

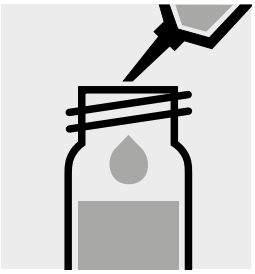
Measuring	0.40	–	8.00	mmol/l
range:	20	–	400	mg/l $CaCO_3$



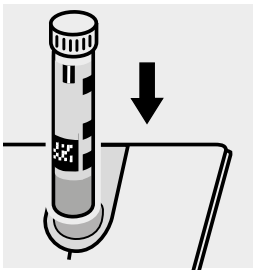
Pipette 4.0 ml of **AC-1** into a round cell.



Add 1.0 ml of the sample with pipette, close the cell with the screw cap, and mix.



Add 0.50 ml of **AC-2** with pipette, close the cell with the screw cap, and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a sodium hydroxide solution 0.1 mol/l, Cat.No. 1.09141, can be used after diluting accordingly (see section "Standard solutions").

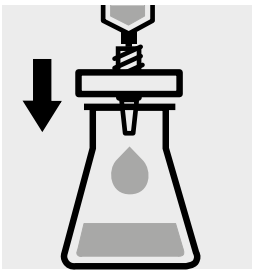
ADMI Color Measurement

corresponds to **APHA 2120F** (ADMI Weighted-Ordinate Spectrophotometric Method)

Application

Measuring range:	10 – 1000	10-mm cell	Method No. 2516
	10 – 500	10-mm cell	Method No. 2517
	2.0 – 100.0	50-mm cell	Method No. 2518
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This zero value remains valid until the method is exited.		

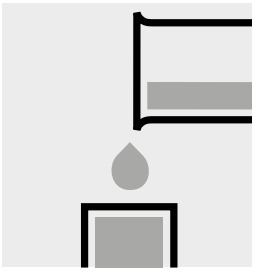
Preparation:



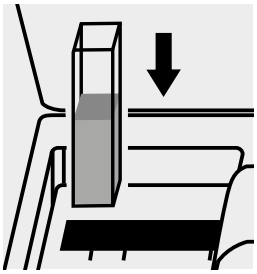
Filter turbid samples.

Determination at the original pH:

Select method no. **2516**, **2517**, or **2518**.
Perform the zero adjustment and confirm by pressing the <OK> button.

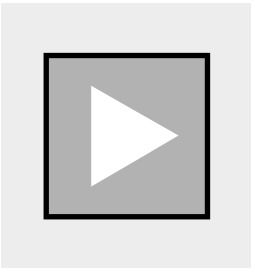


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The ADMI is shown in the display.



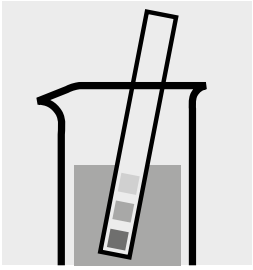
Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

ADMI Color Measurement

corresponds to **APHA 2120F** (ADMI Weighted-Ordinate Spectrophotometric Method)

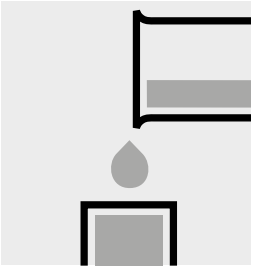
Application

Determination at pH 7.0:

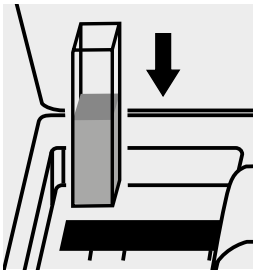


Check the pH of the sample, specified value: pH 7.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

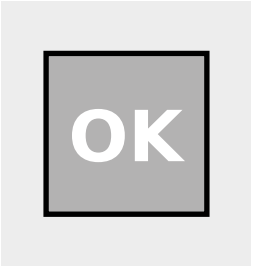
Select method no. **2516**, **2517**, or **2518**.
Perform the zero adjustment and confirm by pressing the <OK> button.



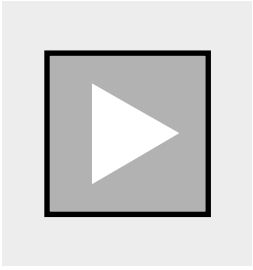
Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Confirm with <OK>.
The ADMI is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Note:

The ADMI factor of 1400 used for calculating the measurement result can be adjusted by the user (see the application for further details).

In the case of **serial measurements** the accuracy of the measurement can be enhanced by making a zero setting prior to **each** individual measurement.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Quality assurance:

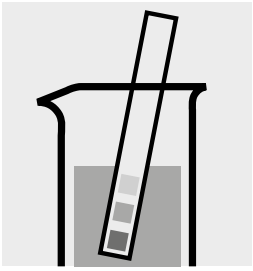
To check the measurement system (measurement device, and handling) ready-to-use platinum-cobalt color reference solution (Hazen 500) Certipur®, Cat.No. 1.00246, concentration 500 mg/l Pt can be used after diluting accordingly.

Aluminium

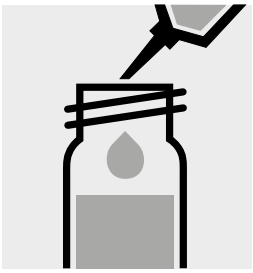
1.00594

Cell Test

Measuring range:	0.02 – 0.50 mg/l Al Expression of results also possible in mmol/l.

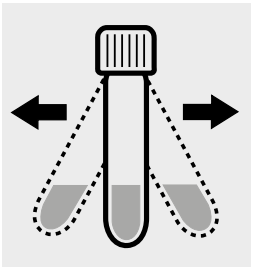


Check the pH of the sample, specified range: pH 3 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

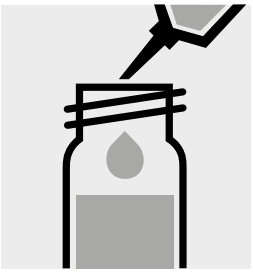


Pipette 6.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level blue microspoon of **Al-1K**, close with the screw cap.

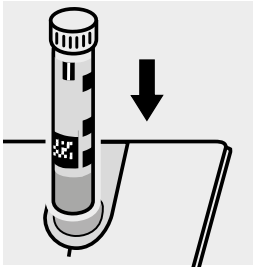


Shake the cell vigorously to dissolve the solid substance.



Add 0.25 ml of **Al-2K** with pipette, close with the screw cap, and mix.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701 or the Standard solution for photometric applications, Cat.No. 1.32225.

Ready-to-use aluminium standard solution Certipur®, Cat.No. 1.19770, concentration 1000 mg/l Al, can also be used after diluting accordingly.

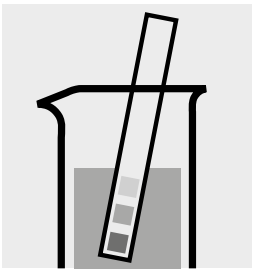
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Aluminium

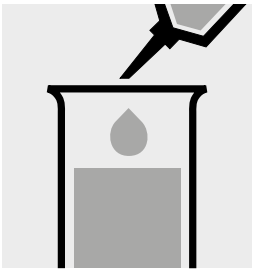
1.14825

Test

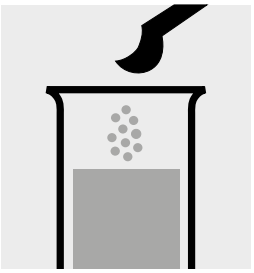
Measuring	0.10 – 1.20	mg/l Al	10-mm cell
range:	0.05 – 0.60	mg/l Al	20-mm cell
	0.020 – 0.200	mg/l Al	50-mm cell
	Expression of results also possible in mmol/l.		



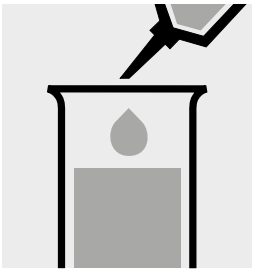
Check the pH of the sample, specified range: pH 3 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



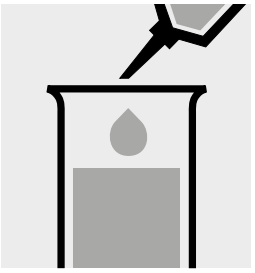
Pipette 5.0 ml of the sample into a test tube.



Add 1 level blue microspoon of **Al-1** to the test tube and dissolve the solid substance.

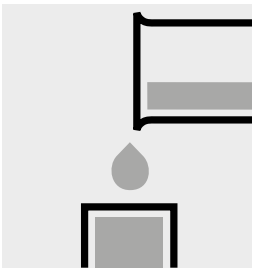


Add 1.2 ml of **Al-2** with pipette and mix.

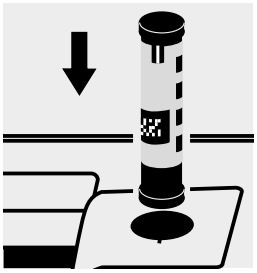


Add 0.25 ml of **Al-3** with pipette and mix.

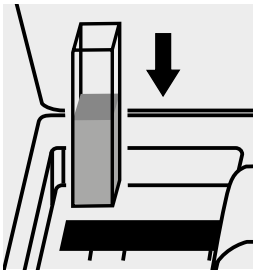
Reaction time:
2 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701 or the Standard solution for photometric applications, Cat.No. 1.32225.

Ready-to-use aluminium standard solution Certipur®, Cat.No. 1.19770, concentration 1000 mg/l Al, can also be used after diluting accordingly.

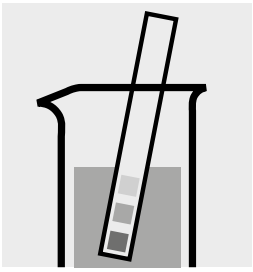
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Ammonia, free

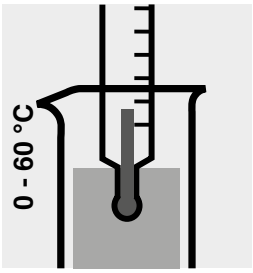
(as ammonium)

Application

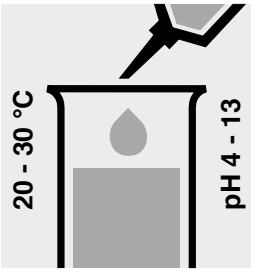
Measuring range:	0.00 – 3.65 mg/l NH_3	0.00 – 3.00 mg/l NH_3-N	10-mm cell Method No. 2520
	0.00 – 1.83 mg/l NH_3	0.00 – 1.50 mg/l NH_3-N	20-mm cell Method No. 2520
	0.000 – 0.730 mg/l NH_3	0.000 – 0.600 mg/l NH_3-N	50-mm cell Method No. 2520



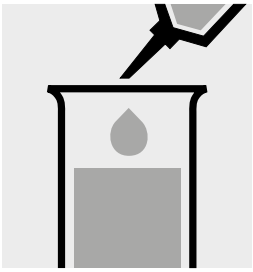
Check the pH of the sample **and note**.



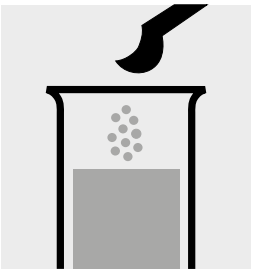
Check the temperature of the solution **and note**.



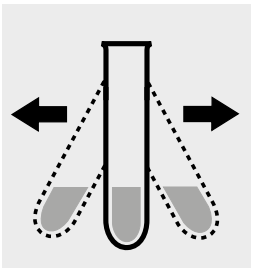
Pipette 5.0 ml of the sample into a test tube. If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH and bring the sample to the appropriate temperature.



Add 0.60 ml of **NH_4-1** (from Spectroquant® Ammonium Test, Cat. No. 1.14752) with pipette and mix.

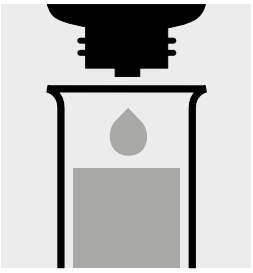


Add 1 level blue microspoon of **NH_4-2** (from Spectroquant® Ammonium Test, Cat. No. 1.14752).



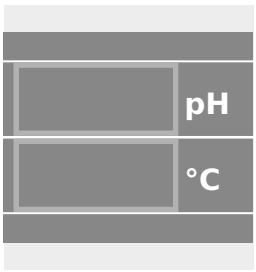
Shake vigorously to dissolve the solid substance.

Reaction time: 5 minutes



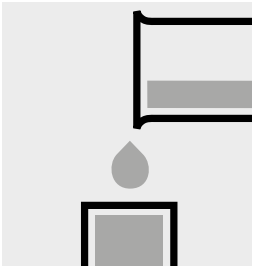
Add 4 drops of **NH_4-3** (from Spectroquant® Ammonium Test, Cat. No. 1.14752) and mix.

Reaction time: 5 minutes

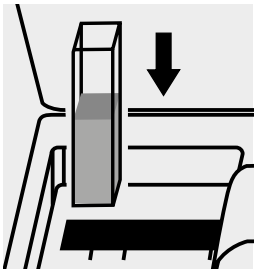


Select method no. **2520**. Enter the pH and the temperature in °C of the original sample.

Tap the <Start> button.



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. The NH_3 and NH_3-N content is shown in the display in mg/l.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Important:

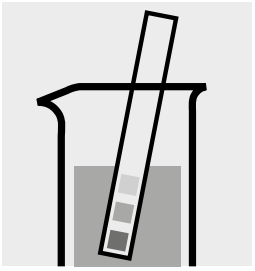
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Ammonium

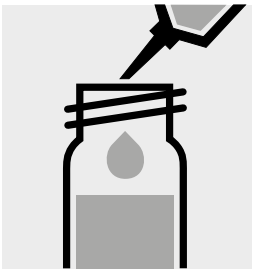
1.14739

Cell Test

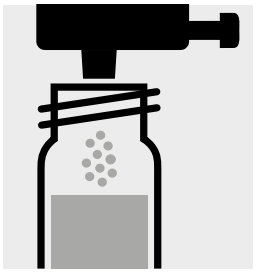
Measuring range:	0.010 – 2.000 mg/l NH_4-N
	0.013 – 2.571 mg/l NH_4
	0.010 – 2.000 mg/l NH_3-N
	0.012 – 2.432 mg/l NH_3
	Expression of results also possible in mmol/l.



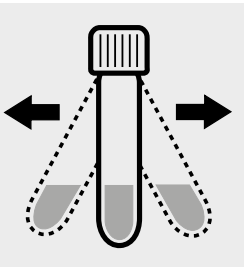
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell close with the screw cap, and mix.

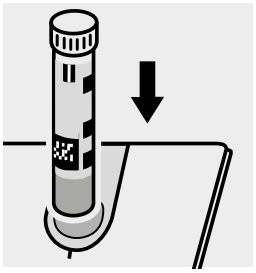


Add 1 dose of **NH_4-1K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solutions for photometric applications, Cat.Nos. 1.25022, 1.25023, and 1.32227.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

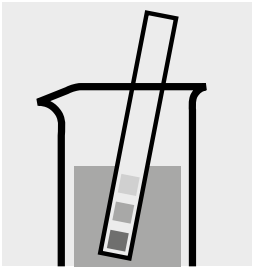
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

Ammonium

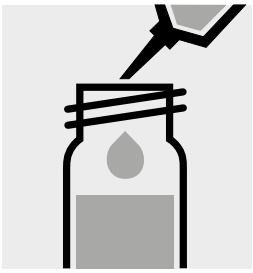
1.14558

Cell Test

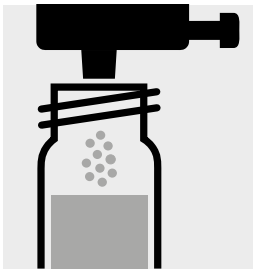
Measuring range:	0.20 – 8.00 mg/l NH_4-N
	0.26 – 10.30 mg/l NH_4
	0.20 – 8.00 mg/l NH_3-N
	0.24 – 9.73 mg/l NH_3
	Expression of results also possible in mmol/l.



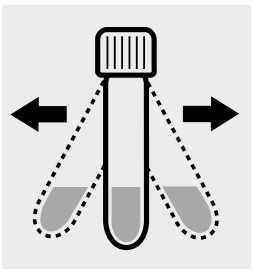
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 1.0 ml of the sample into a reaction cell close with the screw cap, and mix.

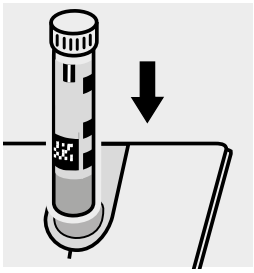


Add 1 dose of **NH_4-1K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25022, 1.25023, 1.25024, and 1.25025.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

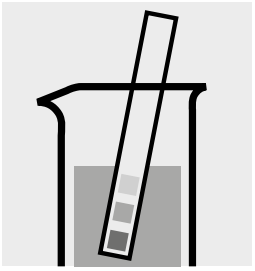
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Ammonium

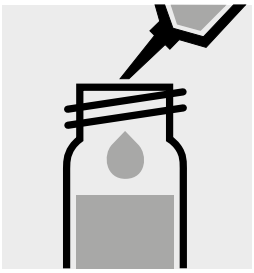
1.14544

Cell Test

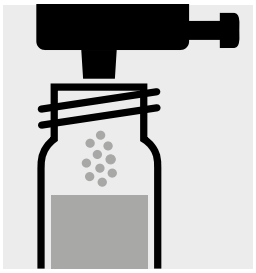
Measuring range:	0.5 – 16.0 mg/l NH_4-N
	0.6 – 20.6 mg/l NH_4
	0.5 – 16.0 mg/l NH_3-N
	0.6 – 19.5 mg/l NH_3
	Expression of results also possible in mmol/l.



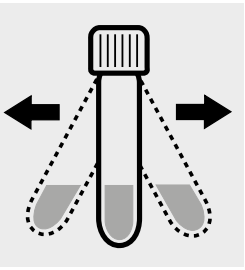
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 0.50 ml of the sample into a reaction cell close with the screw cap, and mix.

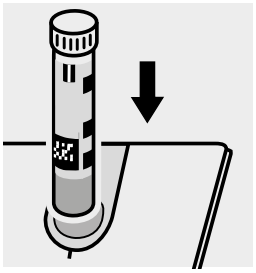


Add 1 dose of **NH_4-1K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25023, 1.25024, 1.25025, and 1.25026.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

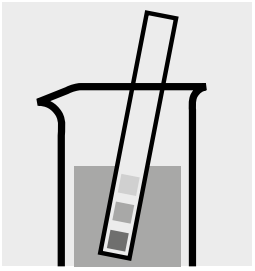
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

Ammonium

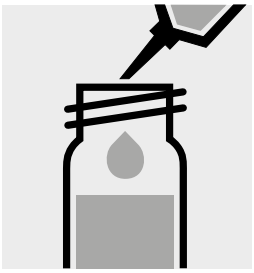
1.14559

Cell Test

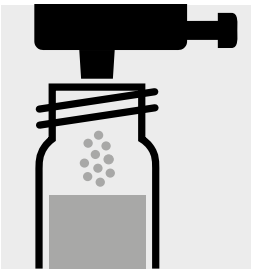
Measuring range:	4.0 – 80.0 mg/l NH_4-N
	5.2 – 103.0 mg/l NH_4
	4.0 – 80.0 mg/l NH_3-N
	4.9 – 97.3 mg/l NH_3
	Expression of results also possible in mmol/l.



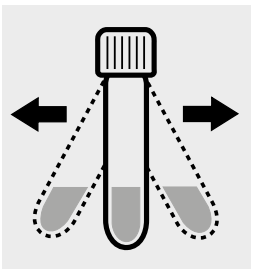
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 0.10 ml of the sample into a reaction cell close with the screw cap, and mix.

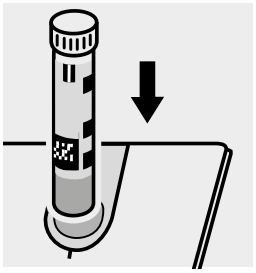


Add 1 dose of **NH_4-1K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 70, Cat.No. 1.14689, or the Standard solutions for photometric applications, Cat.Nos. 1.25025, 1.25026, and 1.25027.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

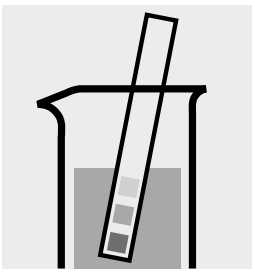
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 70) is highly recommended.

Ammonium

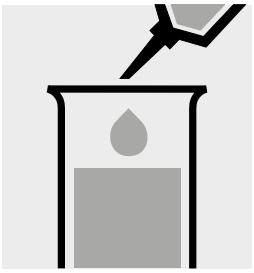
1.14752

Test

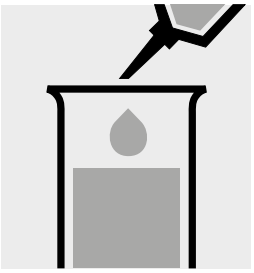
Measuring	0.05 – 3.00 mg/l NH_4-N	0.06 – 3.86 mg/l NH_4	10-mm cell
range:	0.03 – 1.50 mg/l NH_4-N	0.04 – 1.93 mg/l NH_4	20-mm cell
	0.010 – 0.500 mg/l NH_4-N	0.013 – 0.644 mg/l NH_4	50-mm cell
	0.05 – 3.00 mg/l NH_3-N	0.06 – 3.65 mg/l NH_3	10-mm cell
	0.03 – 1.50 mg/l NH_3-N	0.04 – 1.82 mg/l NH_3	20-mm cell
	0.010 – 0.500 mg/l NH_3-N	0.016 – 0.608 mg/l NH_3	50-mm cell
	Expression of results also possible in mmol/l.		



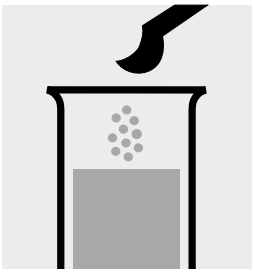
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



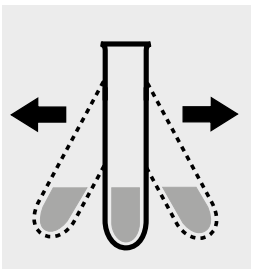
Pipette 5.0 ml of the sample into a test tube.



Add 0.60 ml of **NH_4-1** with pipette and mix.

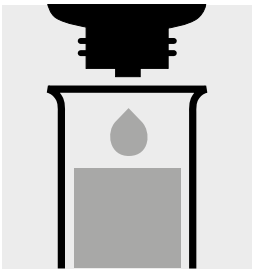


Add 1 level blue microspoon of **NH_4-2**.



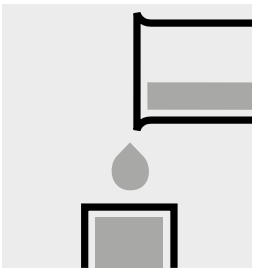
Shake vigorously to dissolve the solid substance.

Reaction time:
5 minutes

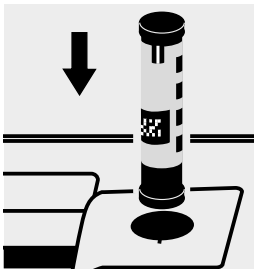


Add 4 drops of **NH_4-3** and mix.

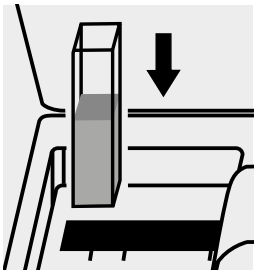
Reaction time:
5 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solutions for photometric applications, Cat.Nos. 1.25022, 1.25023, 1.25024, and 1.32227.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

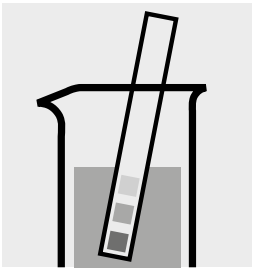
Ammonium

1.00683

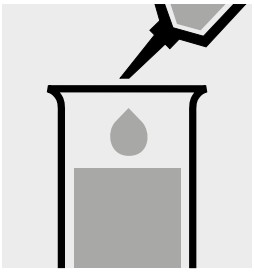
Test

Measuring	2.0 – 75.0	mg/l NH_4-N	2.6 – 96.6	mg/l NH_4	10-mm cell
range:	5 –150	mg/l NH_4-N	6 – 193	mg/l NH_4	10-mm cell
	2.0 – 75.0	mg/l NH_3-N	2.4 – 91.2	mg/l NH_3	10-mm cell
	5 –150	mg/l NH_3-N	6 – 182	mg/l NH_3	10-mm cell
	Expression of results also possible in mmol/l.				

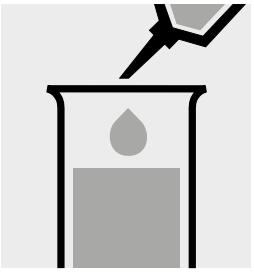
Measuring range: 2.0 – 75.0 mg/l NH_4-N



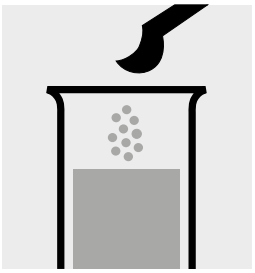
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



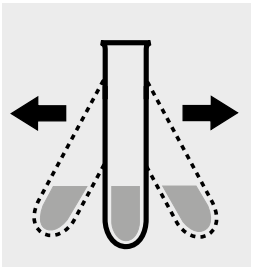
Pipette 5.0 ml of **NH_4-1** into a test tube.



Add 0.20 ml of the sample with pipette.

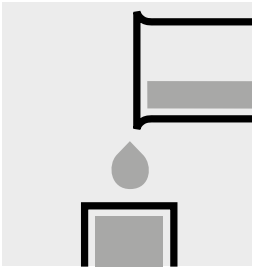


Add 1 level blue micro-spoon of **NH_4-2**.

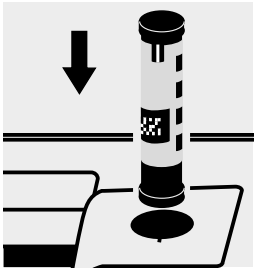


Shake vigorously to dissolve the solid substance.

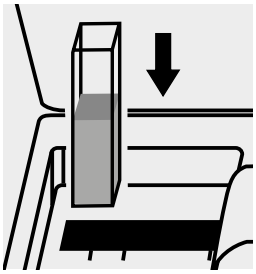
Reaction time:
15 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 2.0 – 75.0 mg/l NH_4-N.



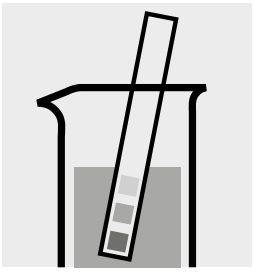
Place the cell into the cell compartment.

Ammonium

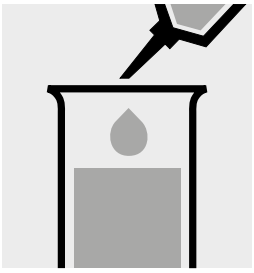
1.00683

Test

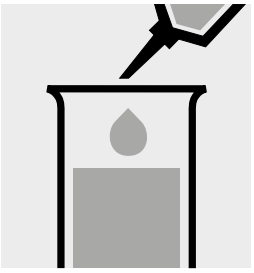
Measuring range: 5 – 150 mg/l NH_4-N



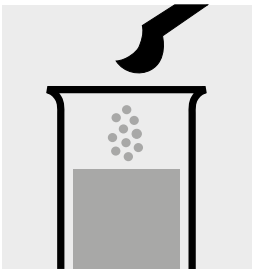
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



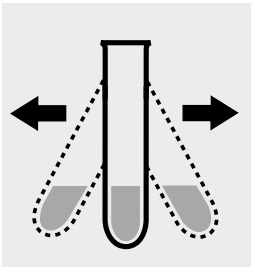
Pipette 5.0 ml of **NH_4-1** into a test tube.



Add 0.10 ml of the sample with pipette.

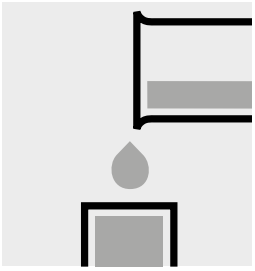


Add 1 level blue micro-spoon of **NH_4-2**.

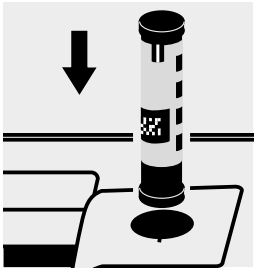


Shake vigorously to dissolve the solid substance.

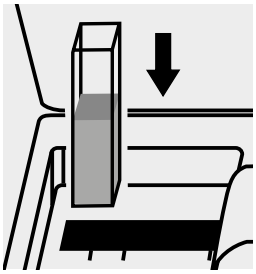
Reaction time:
15 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 5 – 150 mg/l NH_4-N.



Place the cell into the cell compartment.

Important:

Very high ammonium concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 70, Cat.No. 1.14689, or the Standard solutions for photometric applications, Cat.Nos. 1.25025, 1.25026, and 1.25027.

Ready-to-use ammonium standard solution Certipur®, Cat.No. 1.19812, concentration 1000 mg/l NH_4^+, can also be used after diluting accordingly.

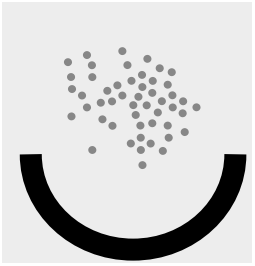
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 70) is highly recommended.

Annatto
in cheese
corresponds to **German Food and Feed Code §64 LFGB 03.00.37**

Application

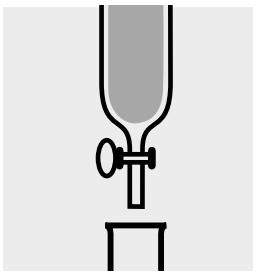
Measuring range:	0.0 – 10.0 mg/kg	10-mm cell	Method No. 2540
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This		
	zero value remains valid until the method is exited.		

Reagent blank:
Extraction of annatto



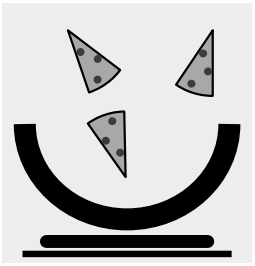
Fill sea sand into a mortar and perform the extraction acc. to §64 LFGB 03.00.37, section 9.1.1 [1]:
blank extract.

Solid-phase extraction (SPE)

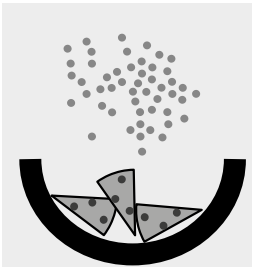


Using the blank extract perform a solid-phase extraction acc. to §64 LFGB 03.00.37, section 9.1.2 [1]:
reagent blank.

Measurement sample:
Extraction of annatto

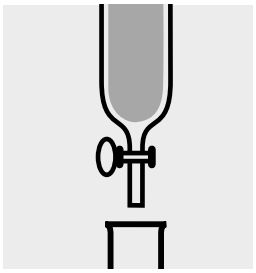


Weigh approx. 5 g of grated cheese into a mortar, accurately weighed to 1 mg.



Mix with sea sand and perform the extraction acc. to §64 LFGB 03.00.37, section 9.1.1 [1]:
sample extract.

Solid-phase extraction (SPE)



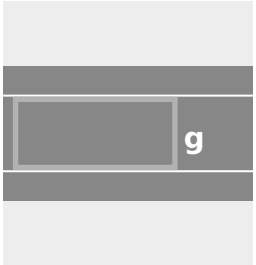
Using the sample extract perform a solid-phase extraction acc. to §64 LFGB 03.00.37, section 9.1.2 [1]:
measurement sample.

Annatto
in cheese
corresponds to **German Food and Feed Code §64 LFGB 03.00.37**

Application

Measurement:

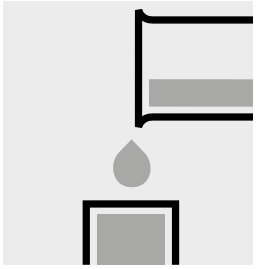
Select method no. **2540**. Perform the zero adjustment and confirm by pressing the <OK> button.



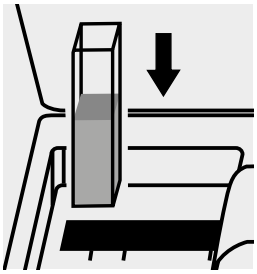
Enter the sample weight in grams.

Confirm with <OK>.

Tap the <Start> button.

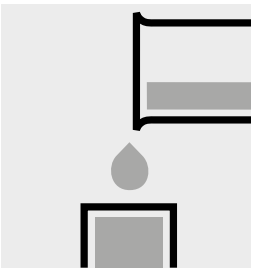


Transfer the solution **"reagent blank"** into the cell.

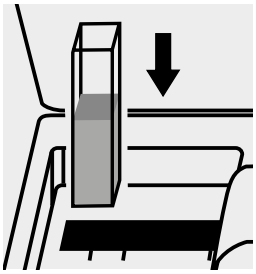


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.



Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

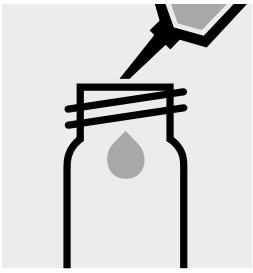
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Antimony in water and wastewater

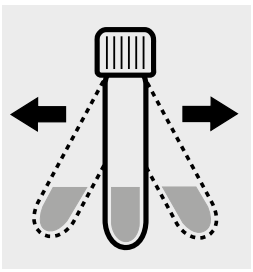
Application

Measuring range: 0.10 – 8.00 mg/l Sb | 10-mm cell | Method No. 130

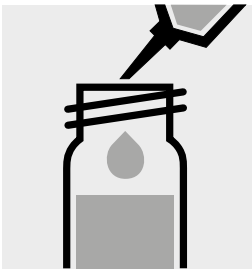


Pipette 4.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

Add approx. 1.5 g of **aluminium chloride hexahydrate extra pure** (Cat.No. 1.01084), close the cell with the screw cap.



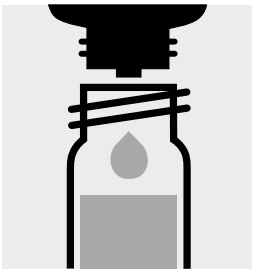
Shake the cell vigorously to dissolve the solid substance.



Add 1.0 ml **phosphoric acid 85 % GR** (Cat.No. 1.00573) with pipette, close the cell with the screw cap, and mix.

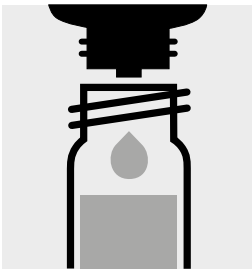
Add 2 drops of **reagent 1**, close the cell with the screw cap, and mix.

Reaction time:
3 minutes

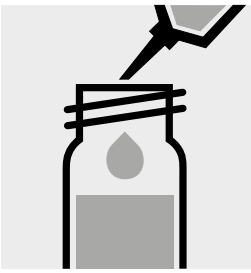


Add 2 drops of **reagent 2**, close the cell with the screw cap, and mix.

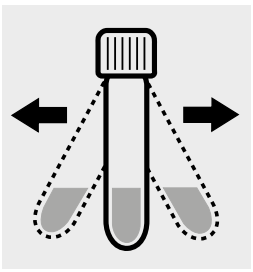
Reaction time:
2 minutes



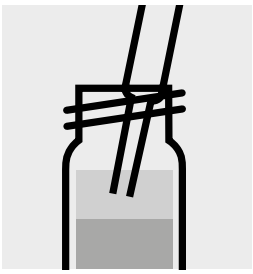
Add 2 drops of **reagent 3**, close the cell with the screw cap, and mix.



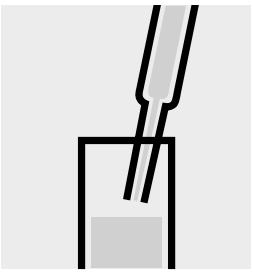
Add 5.0 ml **toluene GR** (Cat.No. 1.08325) with pipette, close the cell with the screw cap.



Shake the cell vigorously for 30 seconds. Leave to stand to allow phases to separate.

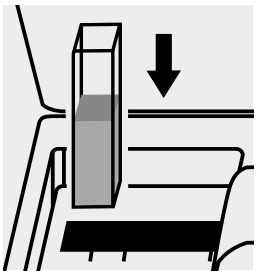


Aspirate the clear upper phase from the tube with pipette.



Transfer the solution into a cell.

Select method no. **130**.



Place the cell into the cell compartment. The measurement is performed automatically.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Important:

The exact composition and preparation of the reagents 1, 2, and 3 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

AOX

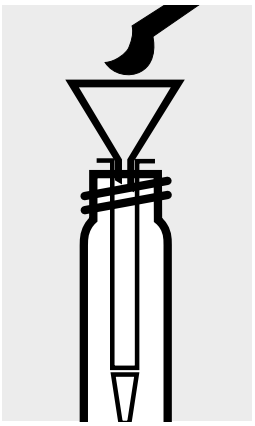
Adsorbable Organic Halogens (x)

1.00675

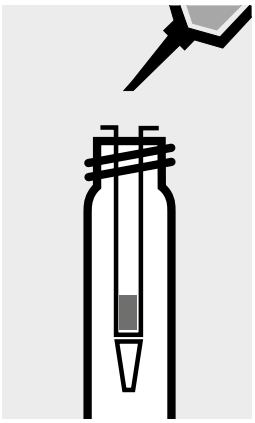
Cell Test

Measuring range: 0.05 – 2.50 mg/l AOX

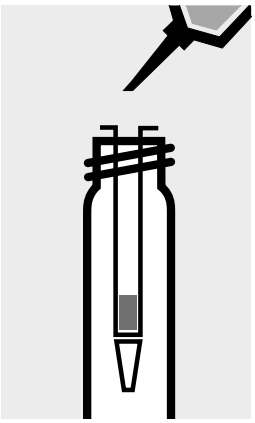
Preparation of the adsorption column:



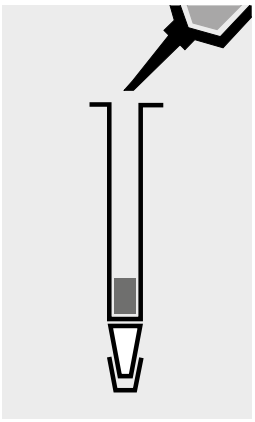
Place the column in an empty cell. Fill 1 level blue microspoon of **AOX-1** into the column using the glass funnel.



Run 3 separate 1-ml portions of **AOX-2** through the column. Discard the wash solution.

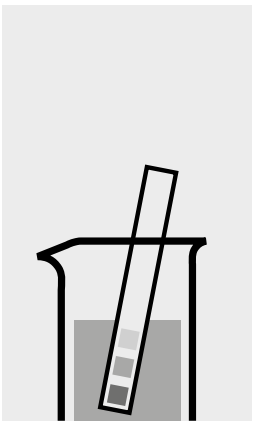


Run 3 separate 1-ml portions of **AOX-3** through the column. Discard the wash solution.

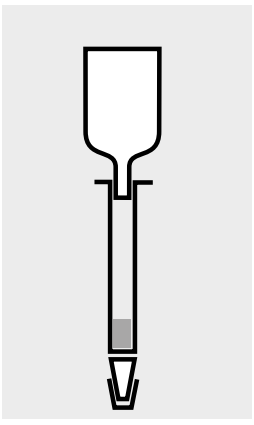


Close the bottom end of the column with the stopper. Apply to the column 1 ml of **AOX-3**. Close the top end of the column with the stopper and swirl to eliminate air bubbles. Remove the stopper on the top end and fill the column to the brim with **AOX-3**.

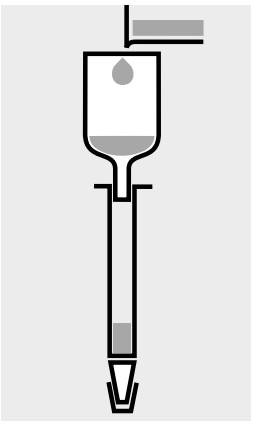
Sample enrichment:



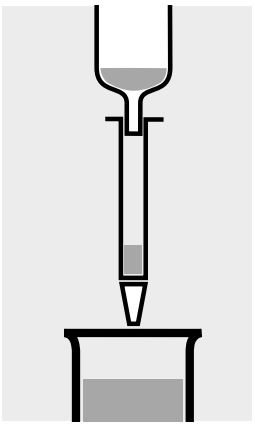
Check the pH of the sample, specified range: pH 6 – 7.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.



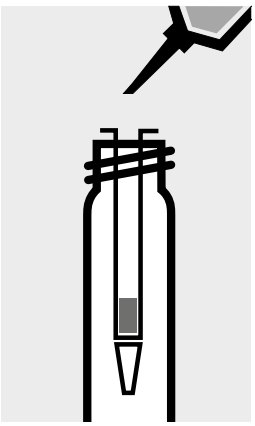
Attach the glass reservoir to the prepared column (closed at the bottom end).



Fill 100 ml of the sample and 6 drops of **AOX-4** into the reservoir.



Remove the stopper from the column outlet and run the sample through completely.



Detach the column from the reservoir. Apply 3 separate 1-ml portions of **AOX-3**. Discard the wash solution.

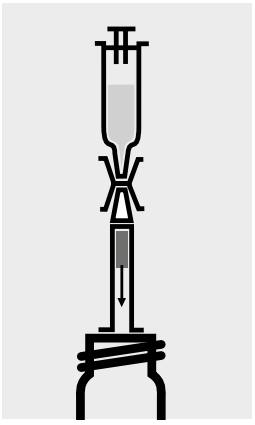
AOX

Adsorbable Organic Halogens (x)

1.00675

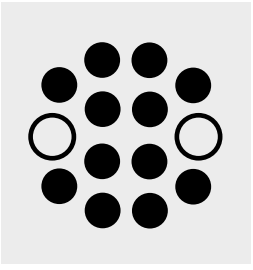
Cell Test

Digestion:

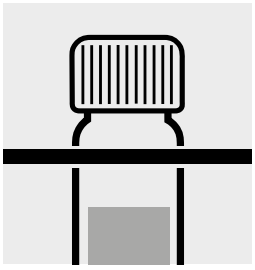


Fill the 10-ml syringe with 10 ml of reagent **AOX-5** and attach the syringe with the column outlet using the connector. Place the top end of the column on an empty cell and rinse the charcoal filling of the column into an empty 16-mm cell.

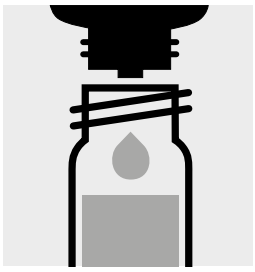
Add 2 level green micro-spoons of **AOX-6**, close the cell with the screw cap, and mix.



Heat the cell at 120 °C in the thermoreactor for 30 minutes.

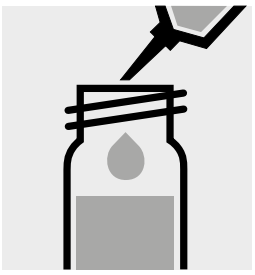


Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.

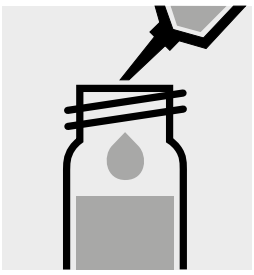


Add 5 drops of **AOX-4**, close the cell and mix; clear supernatant: **pretreated sample**.

Determination:

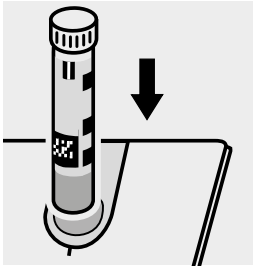


Pipette 0.20 ml of **AOX-1K** into a reaction cell, and mix.



Add 7.0 ml of **pretreated sample** with glass pipette, close the cell with the screw cap, and mix.

Reaction time: 15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + distilled water).

Quality assurance:

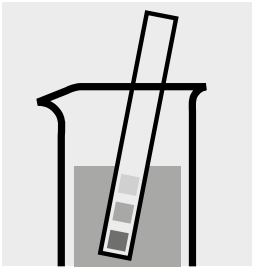
To check the measurement system (test reagents, measurement device, and handling) Spectroquant® AOX Standard, Cat.No. 1.00680, concentration 0.2 – 2.0 mg/l can be used.

Arsenic

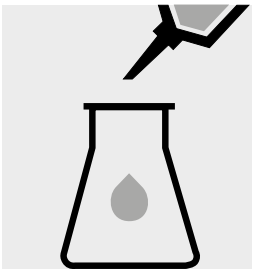
1.01747

Test

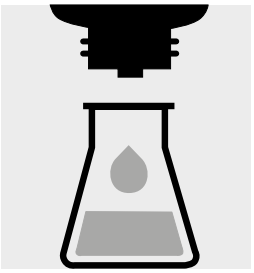
Measuring range:	0.005 – 0.100 mg/l As	10-mm cell
	0.001 – 0.020 mg/l As	20-mm cell
	Expression of results also possible in mmol/l.	



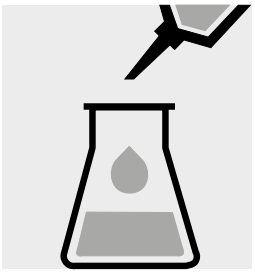
Check the pH of the sample, specified range: pH 0 – 13.



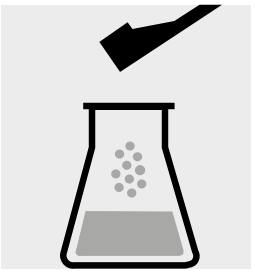
Place 350 ml of the sample into an Erlenmeyer flask with ground joint.



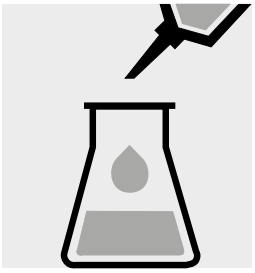
Add 5 drops of **As-1** and mix.



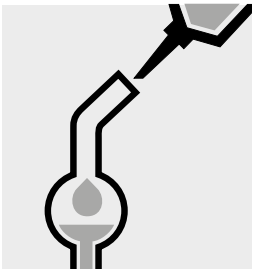
Add 20 ml of **As-2** with pipette and mix.



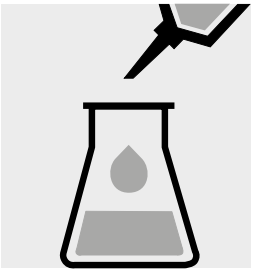
Add 1 level green dosing spoon of **As-3** and dissolve.



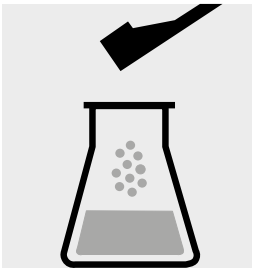
Add 1.0 ml of **As-4** with pipette and mix.



Pipette 5.0 ml of **As-5** into the absorption tube.

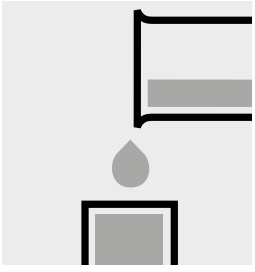


Add 1.0 ml of **As-6** with pipette to the solution in the Erlenmeyer flask and mix.

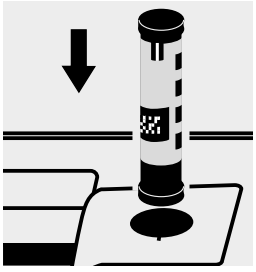


Add 3 level red dosing spoons of **As-7**. **Immediately** attach the absorption tube to the Erlenmeyer flask.

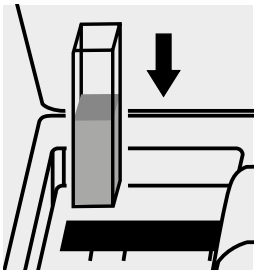
Leave to stand for 2 hours. During this time carefully swirl the flask several times or stir slowly with a magnetic stirrer.



Transfer the solution from the absorption tube into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use arsenic standard solution Certipur®, Cat.No. 1.19773, concentration 1000 mg/l As or the Standard solution for photometric applications, Cat.No. 1.33002 can be used after diluting accordingly.

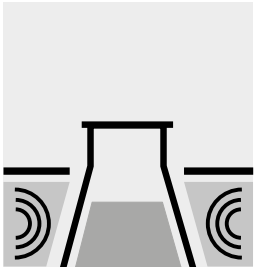
ASTM Color Measurement

analogous to **ASTM D6045**

Application

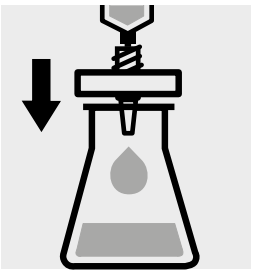
Measuring range:	0.5 – 8.0 ASTM Color	10-mm cell	Method No. 2562
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This		
	zero value remains valid until the method is exited.		

Preparation:



Contains the sample air or gas bubbles: degassing in ultrasonic bath.

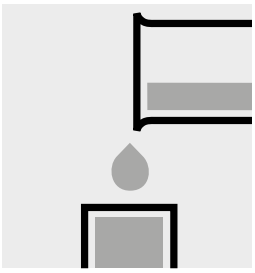
Melt solid samples and homogenize.



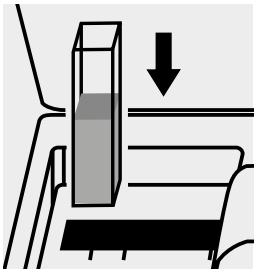
Filter or centrifuge turbid samples.

Determination:

Select method no. **2562**. Perform the zero adjustment and confirm by pressing the <OK> button.

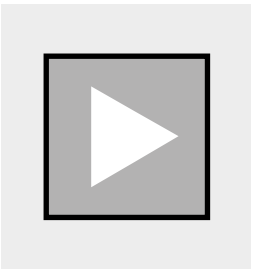


Transfer the solution into the cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. ASTM Color is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

BOD

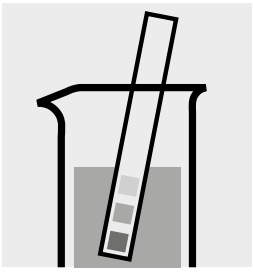
Biochemical Oxygen Demand

1.00687

Cell Test

Measuring range:	0.5 – 3000 mg/l BOD
	0.5 – 3000 mg/l O_2
	Expression of results also possible in mmol/l.

Preparation and incubation:



Check the pH of the sample, specified range: pH 6 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Fill 2 oxygen reaction bottles each with **pretreated sample** and 2 glass beads to overflowing. Close bubble-free with the slanted ground-glass stoppers.

Fill 2 oxygen reaction bottles each with **inoculated nutrient-salt solution** and 2 glass beads to overflowing. Close bubble-free with the slanted ground-glass stoppers.

Measurement of inital oxygen concentration

= Result 1
(measurement sample)
= Result 1
(blank)

Use one bottle of **pretreated sample** and one of **inoculated nutrient-salt solution** for the measurement of the initial oxygen concentration.

Incubate one bottle of **pretreated sample** and one of **inoculated nutrient-salt solution** closed in a thermostatic incubation cabinet at 20 ± 1°C for 5 days.

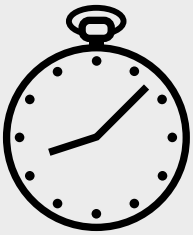
Determination:

Measurement of final oxygen concentration

= Result 2
(measurement sample)
= Result 2
(blank)

After incubation, use one bottle of **pretreated sample** and one of **inoculated nutrient-salt solution** for the measurement of the final oxygen concentration.

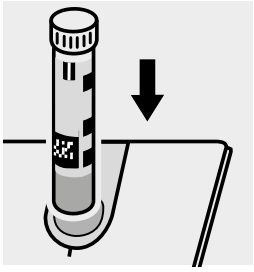
Add 5 drops of **BOD-1K** and then 10 drops of **BOD-2K**, close bubble-free, and mix for approx. 10 seconds.



Reaction time:
1 minute

Add 10 drops of **BOD-3K**, reclose, and mix.

Fill the solution into a round cell.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Calculation:

BOD of measurement sample:
Result 1 – Result 2 (measurement sample) = A in mg/l

BOD of blank:
Result 1 – Result 2 (blank) = B in mg/l

BOD of original sample in mg/l =
= (A – B) x dilution factor

Quality assurance:

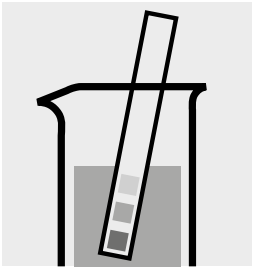
To check the measurement system (test reagents, measurement device, and handling) Spectroquant BOD Standard (acc. to EN 1899), Cat.No. 1.00718, can be used.

Boron

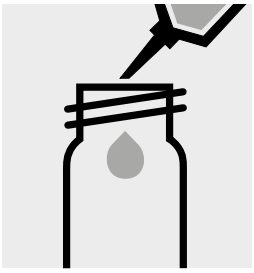
1.00826

Cell Test

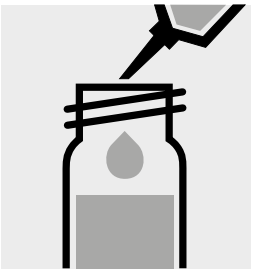
Measuring range:	0.05 – 2.00 mg/l B Expression of results also possible in mmol/l.



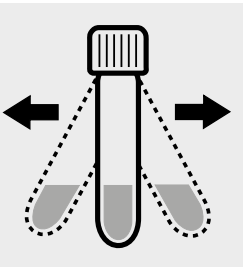
Check the pH of the sample, specified range: pH 2 – 12.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.



Pipette 1.0 ml of **B-1K** into a reaction cell, close with the screw cap, and mix.

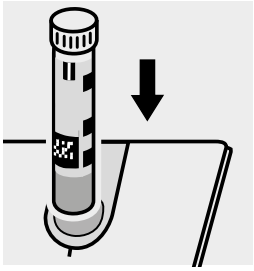


Add 4.0 ml of the sample with pipette into a reaction cell, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 60 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

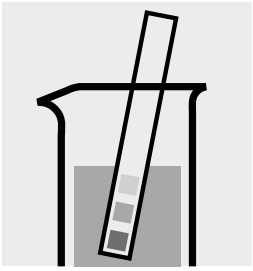
To check the measurement system (test reagents, measurement device, and handling) ready-to-use boron standard solution Certipur®, Cat.No. 1.19500, concentration 1000 mg/l B can also be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.33005.

Boron

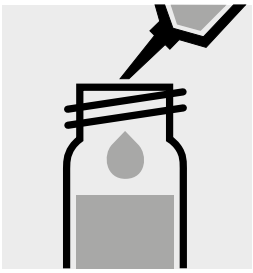
1.14839

Test

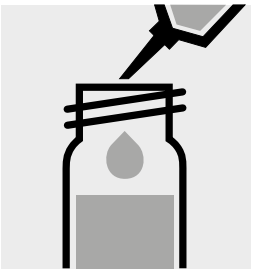
Measuring range:	0.050 – 0.800 mg/l B Expression of results also possible in mmol/l.	10-mm cell



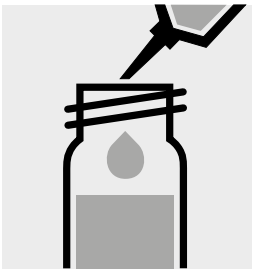
Check the pH of the sample, specified range: pH 1 – 13.



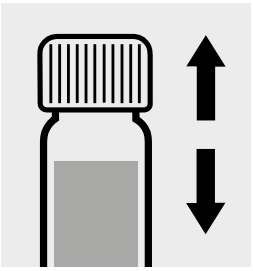
Pipette 5.0 ml of the sample into a test tube with screw cap. **(Important: Do not use test tubes made of glass containing boron!)**



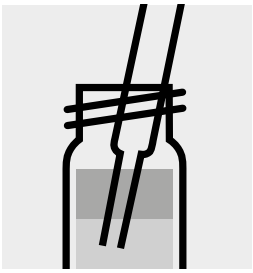
Add 1.0 ml of **B-1** with pipette, close with the screw cap, and mix.



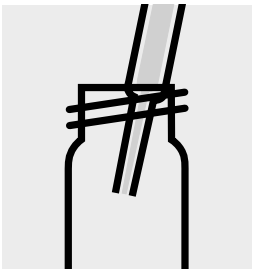
Add 1.5 ml of **B-2** with pipette and close with the screw cap.



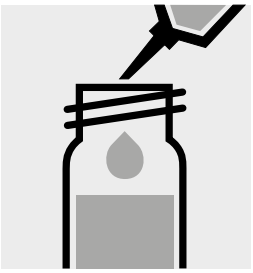
Shake the tube vigorously for 1 minute.



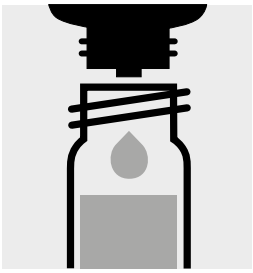
Aspirate 0.5 ml of the clear lower phase from the tube with pipette.



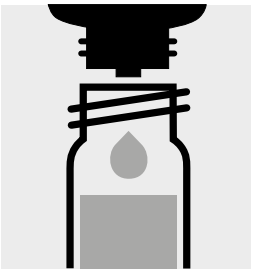
Transfer the extract to a separate fresh tube.



Add 0.80 ml of **B-3** with pipette, close with the screw cap, and mix.

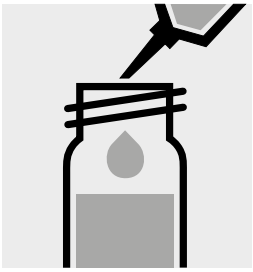


Add 4 drops of **B-4**, close with the screw cap, and mix.



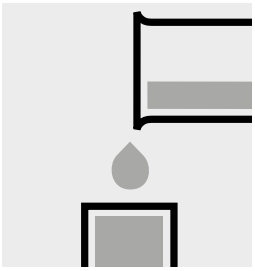
Add 18 drops of **B-5**, close with the screw cap, and mix.

Reaction time: 12 minutes

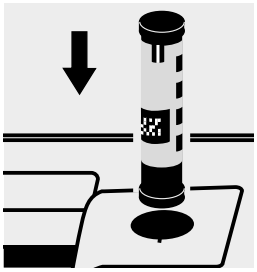


Add 6.0 ml of **B-6** with pipette, close with the screw cap, and mix.

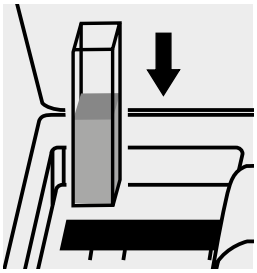
Reaction time: 2 minutes



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

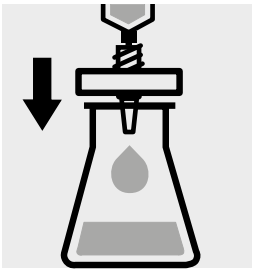
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use boron standard solution Certipur®, Cat.No. 1.19500, concentration 1000 mg/l B can also be used after diluting accordingly.

Bromate in water and drinking water Ultra Low Range

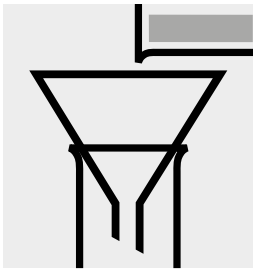
Application

Measuring range:	1.0 – 40.0 µg/l BrO_3	50-mm cell	Method No. 307
	0.5 – 20.0 µg/l BrO_3	100-mm cell	Method No. 307
Attention!	For measurement in the **100-mm cell** both the volume of the prepared sample (fig. 5) as well as the quantities of the reagents must be doubled.		
	The measurement is carried out at 550 nm in a corresponding rectangular cell against a blank, prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and the reagents in an analogous manner.		

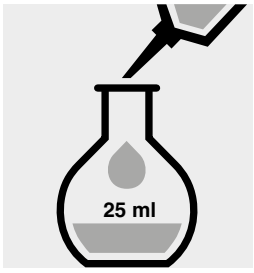


Filter turbid samples.

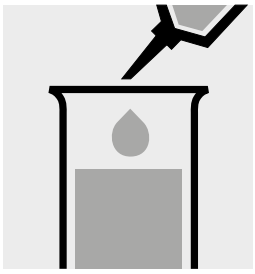
Evaporate 250 ml of sample solution in a glass beaker almost to dryness on the hob.



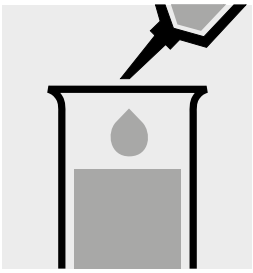
Transfer the residue to a 25-ml volumetric flask using a little distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended).



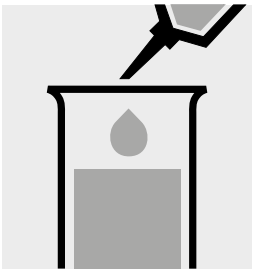
Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended), mix thoroughly, and filter, if necessary: **pretreated sample**.



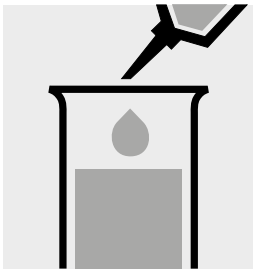
Pipette 10 ml of the pretreated sample into a test tube.



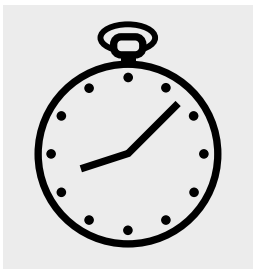
Add 0.10 ml of **reagent 1** with pipette and mix.



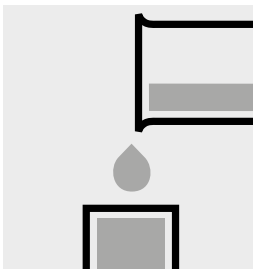
Add 0.20 ml of **reagent 2** with pipette and mix.



Add 0.20 ml **perchloric acid 70 - 72 % GR** (Cat.No. 1.00519) with pipette and mix.

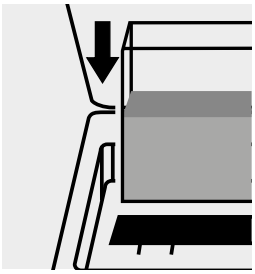


Reaction time: 30 minutes



Filter, if necessary, and transfer the solution into a corresponding cell.

Select method no. **307**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

The exact composition and preparation of the reagents 1 and 2 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

Note:

When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

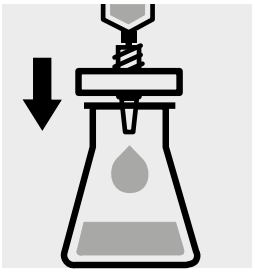
Quality assurance:

To check the measurement system (reagents, measurement device, and handling) Standard solution for photometric applications, Cat.No. 1.33006 can be used.

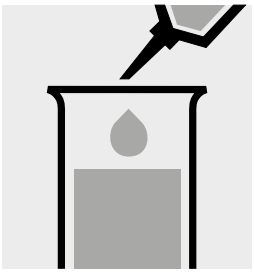
Bromate in water and drinking water Low Range

Application

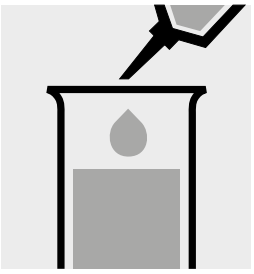
Measuring range:	5.0 – 200.0 µg/l BrO_3	50-mm cell	Method No. 308
	2.5 – 100.0 µg/l BrO_3	100-mm cell	Method No. 308
Attention!	For measurement in the **100-mm cell** both the volume of the prepared sample as well as the quantities of the reagents must be doubled.		
	The measurement is carried out at 550 nm in a corresponding rectangular cell against a blank, prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and the reagents in an analogous manner.		



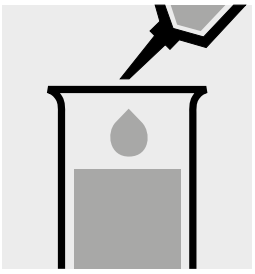
Filter turbid samples.



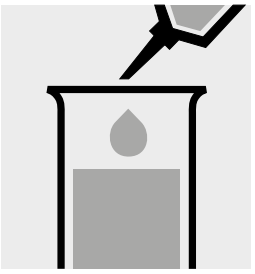
Pipette 10 ml of the pre-treated sample into a test tube.



Add 0.10 ml of **reagent 1** with pipette and mix.

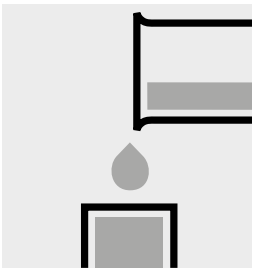


Add 0.20 ml of **reagent 2** with pipette and mix.



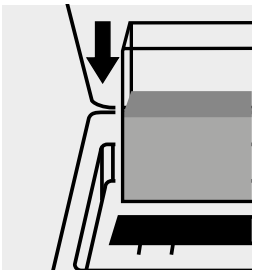
Add 0.20 ml **perchloric acid 70 - 72 % GR** (Cat.No. 1.00519) with pipette and mix.

Reaction time:
30 minutes



Filter, if necessary, and transfer the solution into a corresponding cell.

Select method no. **308**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

The exact composition and preparation of the reagents 1 and 2 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

Note:

When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

Quality assurance:

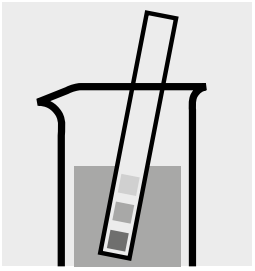
To check the measurement system (reagents, measurement device, and handling) Standard solutions for photometric applications, Cat.Nos. 1.33006 and 1.33007 can be used.

Bromine

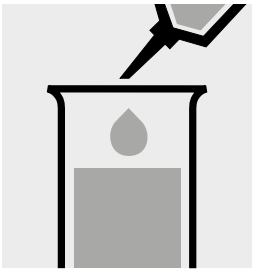
1.00605

Test

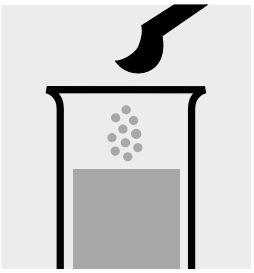
Measuring range:	0.10 – 10.00 mg/l Br_2	10-mm cell
	0.05 – 5.00 mg/l Br_2	20-mm cell
	0.020 – 2.000 mg/l Br_2	50-mm cell
	Expression of results also possible in mmol/l.	



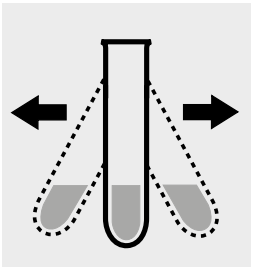
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 10 ml of the sample into a test tube.

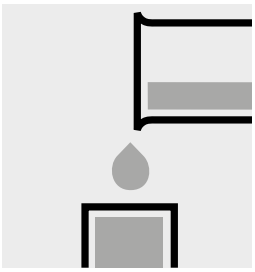


Add 1 level blue micro-spoon of **Br_2-1.**

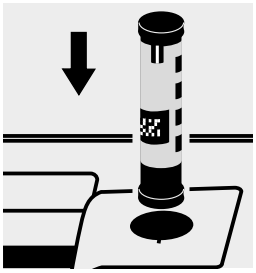


Shake vigorously to dissolve the solid substance.

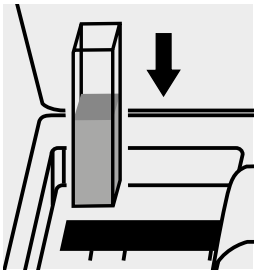
Reaction time: 1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high bromine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Note:

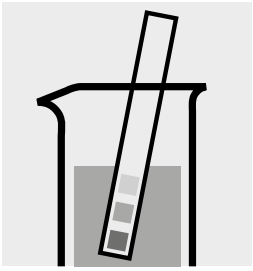
Bromine can also be determined with Spectroquant® Chlorine Test, Cat. No. 1.00598 (see corresponding application notes on www.sigmaaldrich.com).

Cadmium

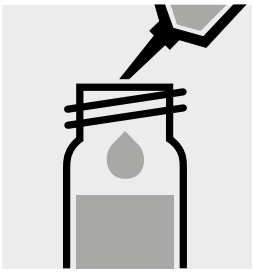
1.14834

Cell Test

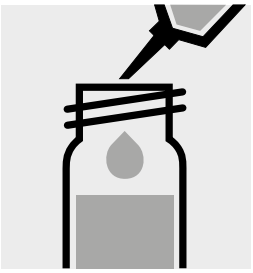
Measuring range:	0.025 – 1.000 mg/l Cd Expression of results also possible in mmol/l.



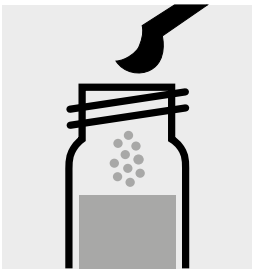
Check the pH of the sample, specified range: pH 3 – 11.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



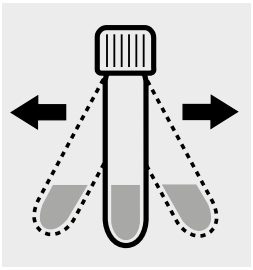
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 0.20 ml of **Cd-1K** with pipette, close the cell with the screw cap, and mix.

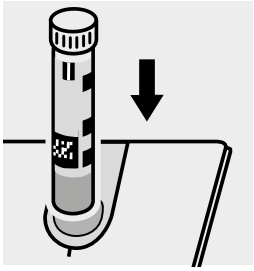


Add 1 level green microspoon of **Cd-2K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
2 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total cadmium** a pretreatment with Crack Set 10C, Cat.No. 1.14688 or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of cadmium (Σ Cd).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700.

Ready-to-use cadmium standard solution Certipur®, Cat.No. 1.19777, concentration 1000 mg/l Cd, can also be used after diluting accordingly.

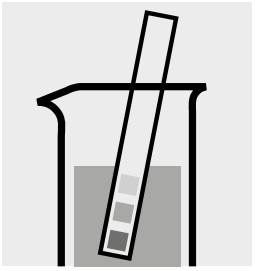
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Cadmium

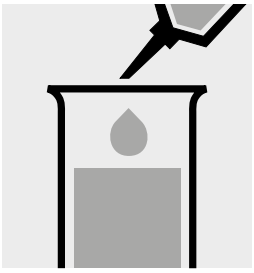
1.01745

Test

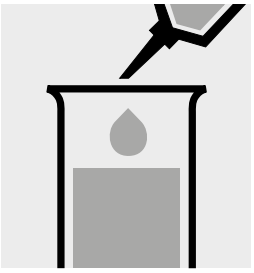
Measuring	0.01 – 0.500	mg/l Cd	10-mm cell
range:	0.005 – 0.250	mg/l Cd	20-mm cell
	0.0020 – 0.1000	mg/l Cd	50-mm cell
	Expression of results also possible in mmol/l.		



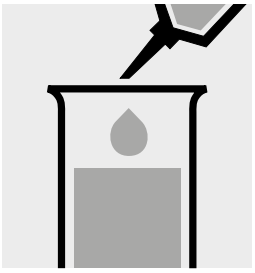
Check the pH of the sample, specified range: pH 3 – 11.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



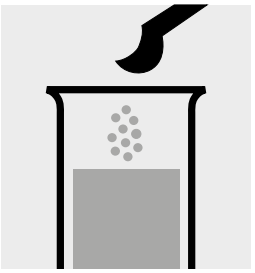
Pipette 1.0 ml of **Cd-1** into a test tube.



Add 10 ml of the sample with pipette and mix.

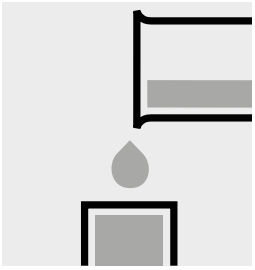


Add 0.20 ml of **Cd-2** with pipette and mix.

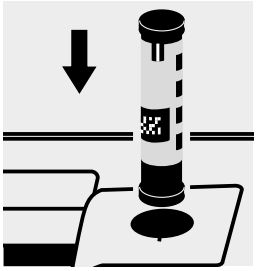


Add 1 level green microspoon of **Cd-3** and dissolve the solid substance.

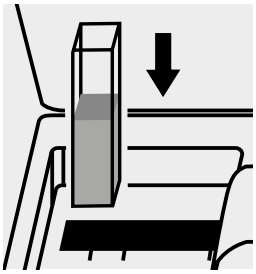
Reaction time:
2 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total cadmium** a pretreatment with Crack Set 10C, Cat.No. 1.14688 or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of cadmium (Σ Cd).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solution for photometric applications, Cat.No. 1.33008.

Ready-to-use cadmium standard solution Certipur®, Cat.No. 1.19777, concentration 1000 mg/l Cd, can also be used after diluting accordingly.

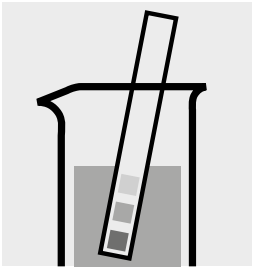
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Calcium

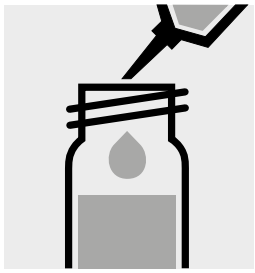
1.00858

Cell Test

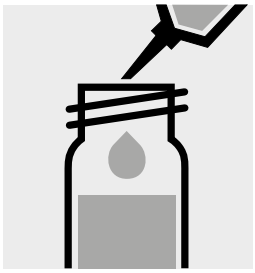
Measuring range:	10 – 250 mg/l Ca
	14 – 350 mg/l CaO
	25 – 624 mg/l $CaCO_3$
	Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

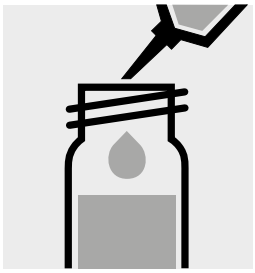


Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

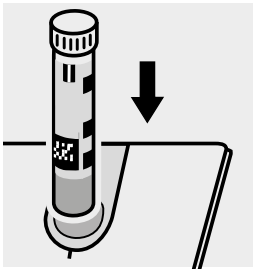


Add 1.0 ml of **Ca-1K** with pipette, close the cell with the screw cap, and mix.

Reaction time: **exactly** 3 minutes



Add 0.50 ml of **Ca-2K** with pipette, close the cell with the screw cap, and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

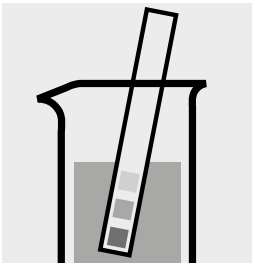
Calcium

1.14815

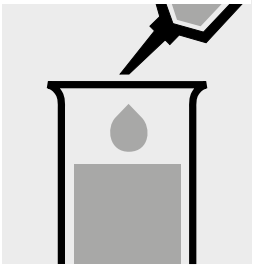
Test

Measuring	10	– 160	mg/l Ca	14	– 224	mg/l CaO	25	– 400	mg/l $CaCO_3$	10-mm cell
range:	5	– 80	mg/l Ca	7	– 112	mg/l CaO	12	– 200	mg/l $CaCO_3$	20-mm cell
	1.0	– 15.0	mg/l Ca	1.4	– 21.0	mg/l CaO	2.5	– 37.5	mg/l $CaCO_3$	10-mm cell
	Expression of results also possible in mmol/l.									

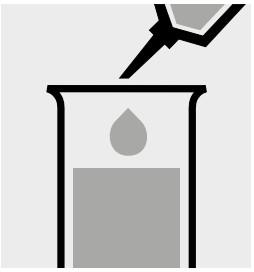
Measuring range: 5 – 160 mg/l Ca



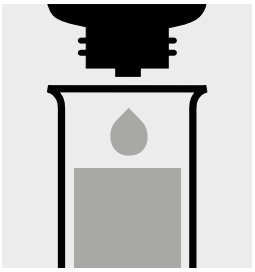
Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



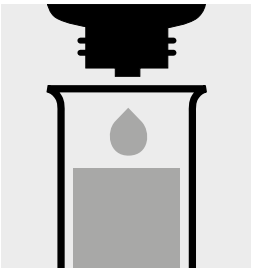
Pipette 0.10 ml of the sample into a test tube.



Add 5.0 ml of **Ca-1** with pipette and mix.

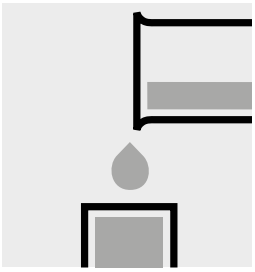


Add 4 drops of **Ca-2** and mix.

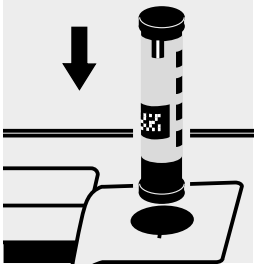


Add 4 drops of **Ca-3** and mix.

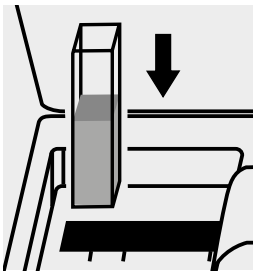
Reaction time:
8 minutes, **measure immediately**.



Transfer the solution into a corresponding cell



Select method with AutoSelector measuring range 5 - 160 mg/l Ca.



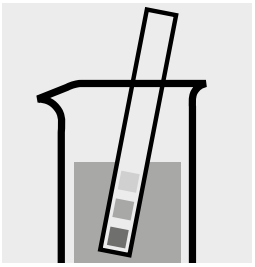
Place the cell into the cell compartment.

Calcium

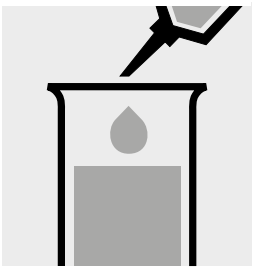
1.14815

Test

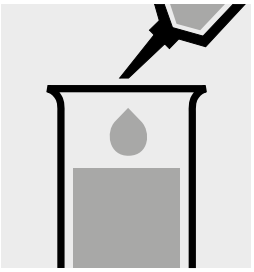
Measuring range: 1.0 – 15.0 mg/l Ca



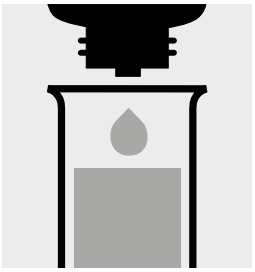
Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



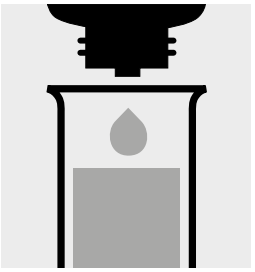
Pipette 0.50 ml of the sample into a test tube.



Add 5.0 ml of **Ca-1** with pipette and mix.

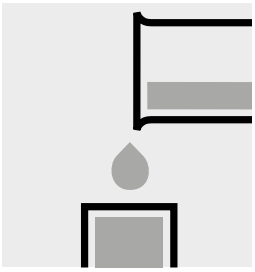


Add 4 drops of **Ca-2** and mix.

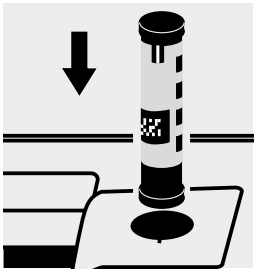


Add 4 drops of **Ca-3** and mix.

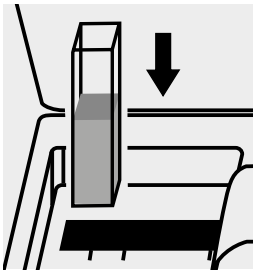
Reaction time:
8 minutes, **measure immediately**.



Transfer the solution into a cell



Select method with AutoSelector measuring range 1.0 – 15.0 mg/l Ca.



Place the cell into the cell compartment.

Quality assurance:

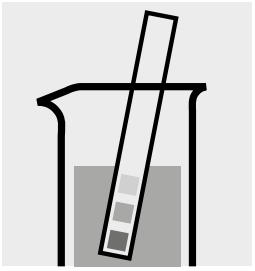
To check the measurement system (test reagents, measurement device, and handling) ready-to-use calcium standard solution Certipur®, Cat.No. 1.19778, concentration 1000 mg/l Ca, can be used after diluting accordingly.

Calcium

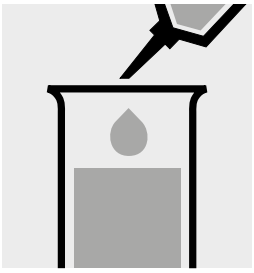
1.00049

Test

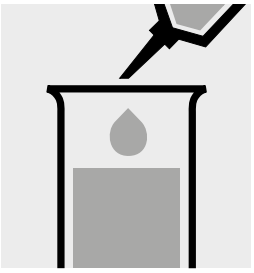
Measuring range:	0.20 – 4.00 mg/l Ca Expression of results also possible in mmol/l.	10-mm cell



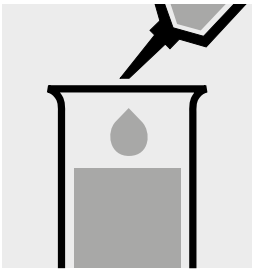
Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

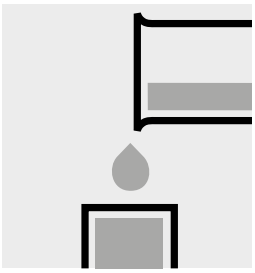


Add 0.50 ml of **Ca-1** with pipette and mix.



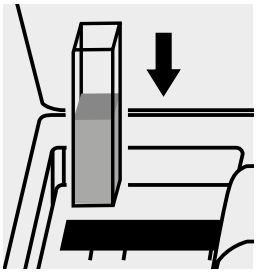
Add 0.50 ml of **Ca-2** with pipette and mix.

Reaction time: 5 minutes



Transfer the solution into a cell.

Select method no. **304**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

A separate calibration must be made for each batch. It is recommended to perform a calibration with a blank and 5 standard solutions over the entire measuring range. The calibration should be checked regularly using standard solutions.

Quality assurance:

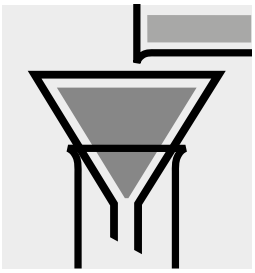
To check the measurement system (test reagents, measurement device, and handling) ready-to-use calcium standard solution Certipur®, Cat.No. 1.19778, concentration 1000 mg/l Ca, can be used after diluting accordingly.

Carotene
in raw palm oil
corresponds to **EN ISO 17923:2011**

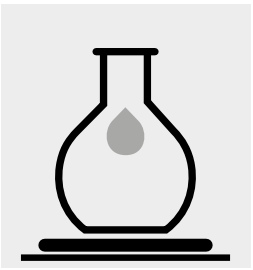
Application

Measuring range:	10 – 7500 mg/kg β-Car	10-mm cell	Method No. 2523
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.		

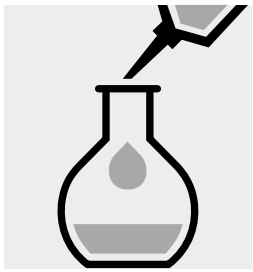
Melt the sample and homogenize.



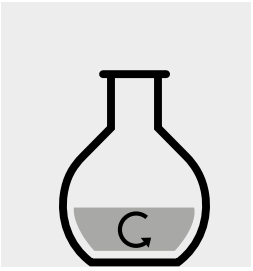
If contaminations are present, filter the sample over a fast filtering paper.



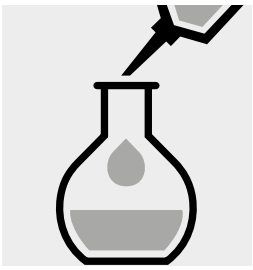
Weigh **between 100.0 mg to 500.0 mg of sample** into a volumetric flask, accurately weighed to 0.1 mg.



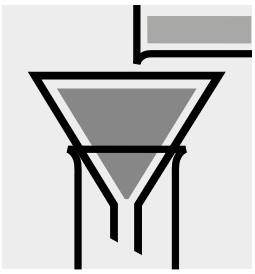
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718).



Dissolve the sample at room temperature.



Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) and mix.

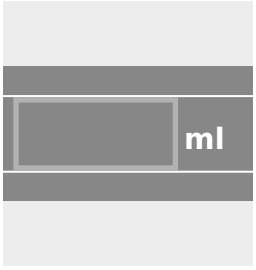


Filter turbid solutions over a paper filter.

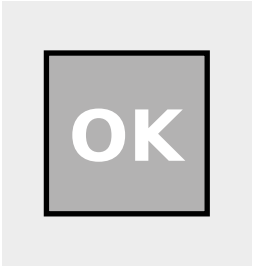
Select method no. **2523**. Perform the zero adjustment and confirm by pressing the <OK> button.

Enter the sample weight in milligrams.

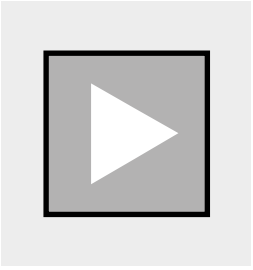
Confirm with <OK>.



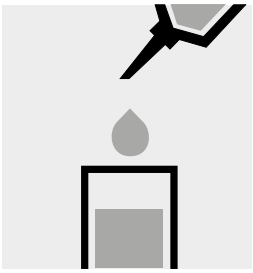
Enter the volume of the sample solution in milliliters.



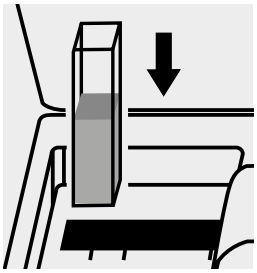
Confirm with <OK>.



Tap the <Start> button.

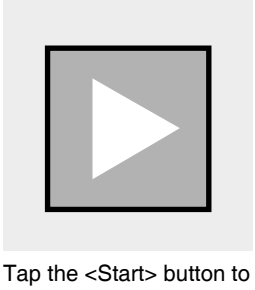


Transfer the solution into a cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The β-carotene content is shown in the display in mg/kg.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

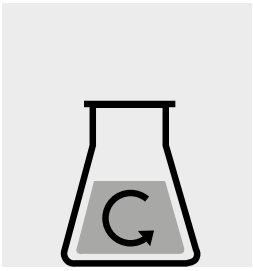
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Cell Density (OD600)

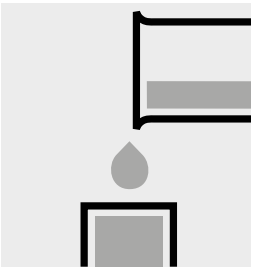
Application

Measuring range:	-0.020 – 1.200 OD_{600}	10-mm cell	Method No. 313
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from sample solvent, is recommended. This zero value remains valid until the method		
	is exited.		

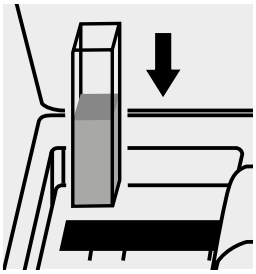


Homogenize the sample **carefully** and dilute, if necessary: **measurement sample**.

Select method no. **313**. Perform the zero adjustment with **sample solvent** and confirm by pressing the <OK> button.



Transfer the **measurement sample** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

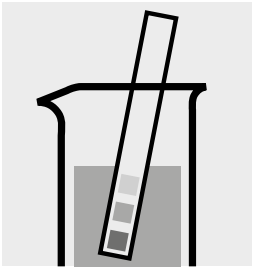
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Chloride

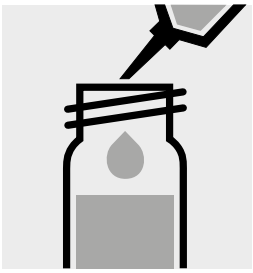
1.14730

Cell Test

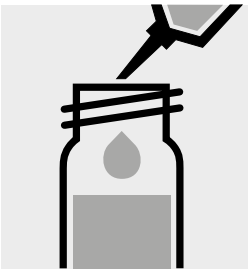
Measuring range:	5 – 1.25 mg/l Cl Expression of results also possible in mmol/l.



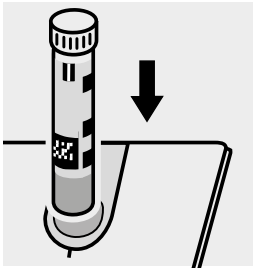
Check the pH of the sample, specified range: pH 1 – 12.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



Pipette 0.50 ml of **Cl-1K** into a reaction cell, close with the screw cap, and mix.



Add 1.0 ml of the sample with pipette, close with the screw cap, and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10 and 20, Cat.Nos. 1.14676 and 1.14675 or the Standard solutions for photometric applications, Cat.Nos. 1.32229 and 1.32230.

Ready-to-use chloride standard solution Certipur®, Cat.No. 1.19897, concentration 1000 mg/l Cl^-, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

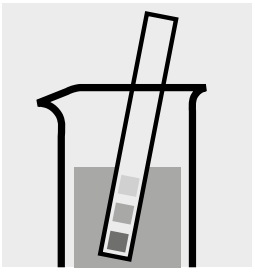
Chloride

1.14897

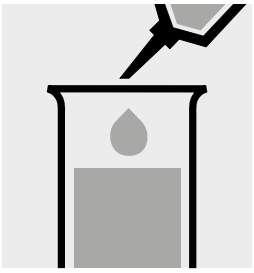
Test

Measuring range:	10 – 250 mg/l Cl	10-mm cell
	2.5 – 25.0 mg/l Cl	10-mm cell
	Expression of results also possible in mmol/l.	

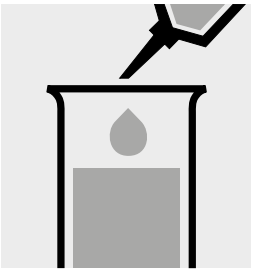
Measuring range: 10 – 250 mg/l Cl



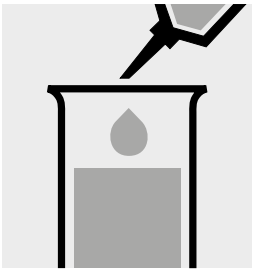
Check the pH of the sample, specified range: pH 1 – 12.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



Pipette 1.0 ml of the sample into a test tube.

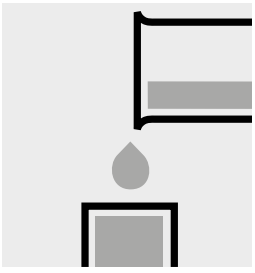


Add 2.5 ml of **Cl-1** with pipette and mix.

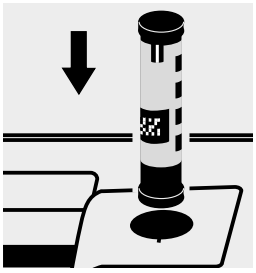


Add 0.50 ml of **Cl-2** with pipette and mix.

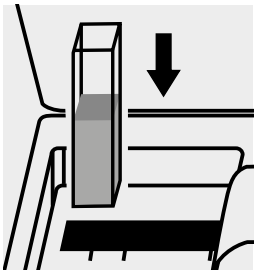
Reaction time: 1 minute



Transfer the solution into a cell.



Select method with AutoSelector measuring range 10 – 250 mg/l Cl.



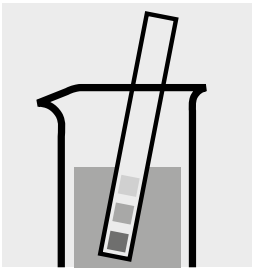
Place the cell into the cell compartment.

Chloride

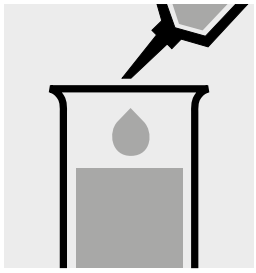
1.14897

Test

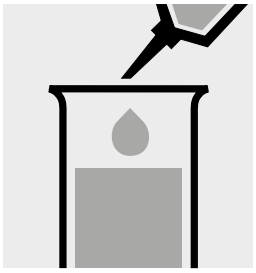
Measuring range: 2.5 – 25.0 mg/l Cl



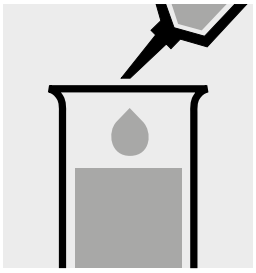
Check the pH of the sample, specified range: pH 1 – 12.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

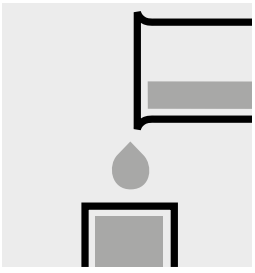


Add 2.5 ml of **Cl-1** with pipette and mix.

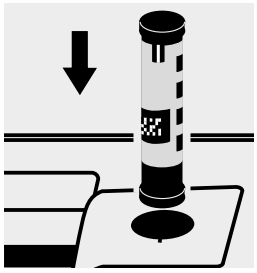


Add 0.50 ml of **Cl-2** with pipette and mix.

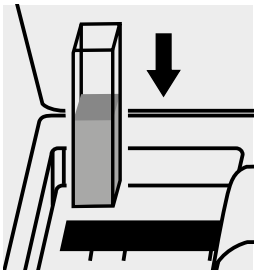
Reaction time:
1 minute



Transfer the solution into a cell.



Select method with AutoSelector measuring range 2.5 – 25.0 mg/l Cl.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 60, Cat.No. 1.14696 or the Standard solutions for photometric applications, Cat.Nos. 1.32229 and 1.32230.

Ready-to-use chloride standard solution Certipur®, Cat.No. 1.19897, concentration 1000 mg/l Cl^-, can also be used after diluting accordingly.

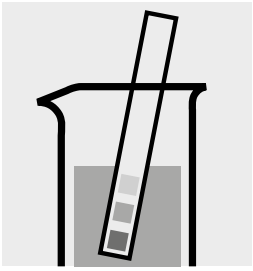
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 60) is highly recommended.

Chloride

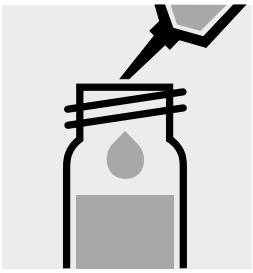
1.01804

Cell Test

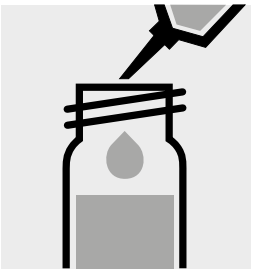
Measuring range:	0.5 – 15.0 mg/l Cl Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 3 – 11.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.

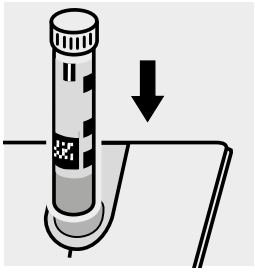


Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 0.25 ml of **Cl-1K** with pipette, close with the screw cap, and mix.

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

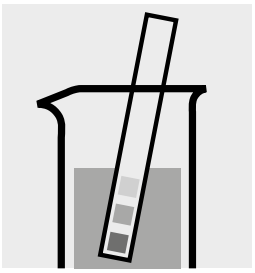
To check the measurement system (test reagents, measurement device, and handling) ready-to-use chloride standard solution Certipur®, Cat.No. 1.19897, concentration 1000 mg/l Cl^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32229, 1.33010, and 1.33011.

Chloride

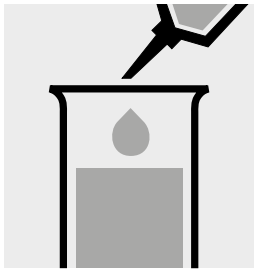
1.01807

Test

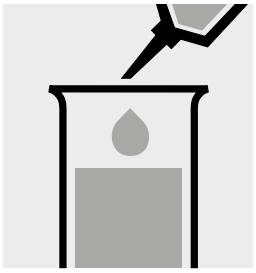
Measuring range:	0.10 – 5.00 mg/l Cl Expression of results also possible in mmol/l.	50-mm cell



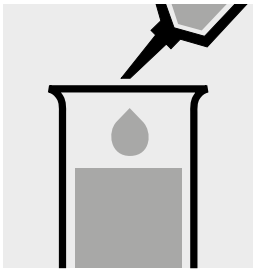
Check the pH of the sample, specified range: pH 3 – 11.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



Pipette 0.20 ml each of **Cl-1** into two test tubes.

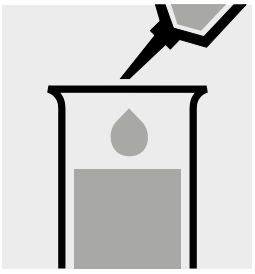


Add to one tube 10 ml of the sample with pipette and mix.

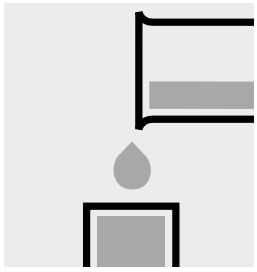


Add to the second tube 10 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) with pipette and mix. (Blank)

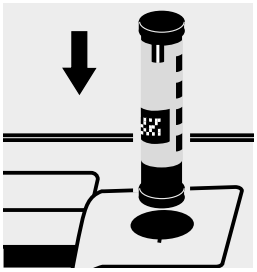
Reaction time: 10 minutes



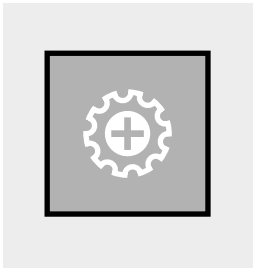
Add to each tube 0.20 ml of **Cl-2** with pipette and mix.



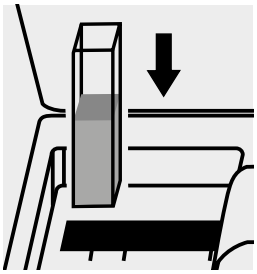
Transfer both solutions into two separate 50-mm-cells.



Select method with AutoSelector.

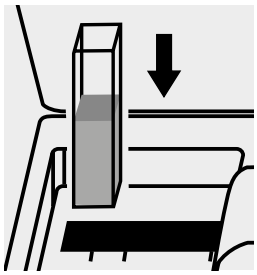


Tap the <Settings> button.
Select "Reagent blank".



Place the blank cell into the cell compartment.

Select "User RB".
Confirm with <OK>.



Place the cell containing the sample into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use chloride standard solution Certipur®, Cat.No. 1.19897, concentration 1000 mg/l Cl^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.33010 and 1.33011.

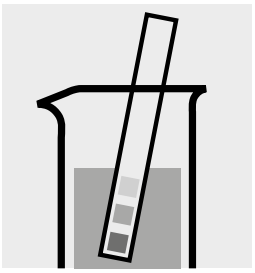
Chlorine

Determination of free chlorine

1.00595

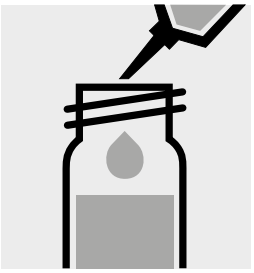
Cell Test

Measuring range:	0.03 – 6.00 mg/l Cl_2 Expression of results also possible in mmol/l.

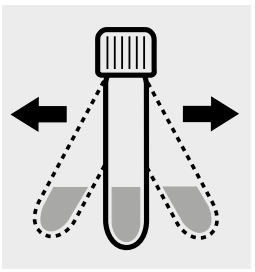


Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Place 1 level blue micro-spoon of **Cl_2-1** into a round cell.

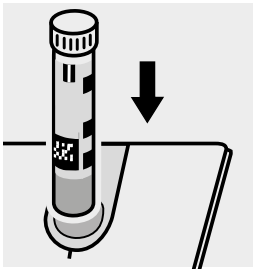


Add 5.0 ml of the sample with pipette, close with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine

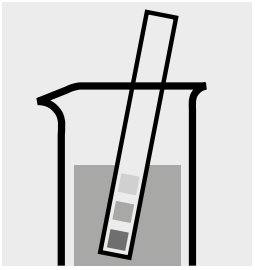
Determination of free chlorine and total chlorine

1.00597

Cell Test

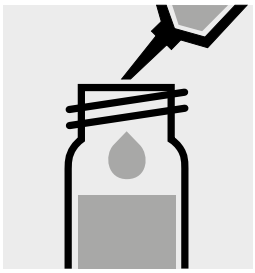
Measuring range:	0.03 – 6.00 mg/l Cl_2 Expression of results also possible in mmol/l.

Determination of free chlorine

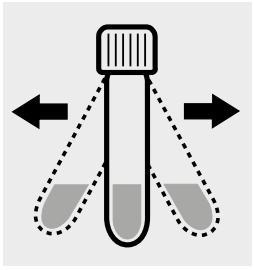


Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

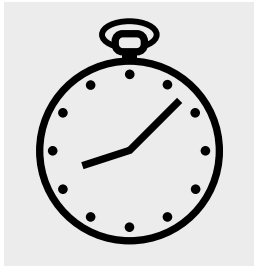
Place 1 level blue micro-spoon of **Cl_2-1** into a round cell.



Add 5.0 ml of the sample with pipette, close with the screw cap.

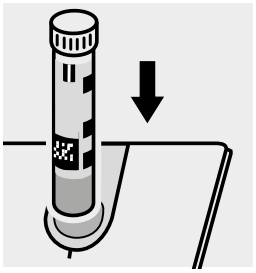


Shake the cell vigorously to dissolve the solid substance.

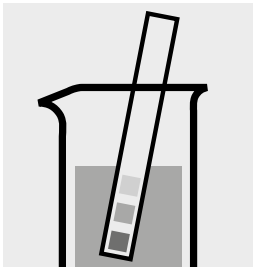


Reaction time:
1 minute

Determination of total chlorine

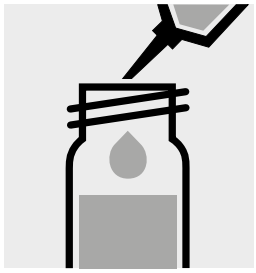


Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

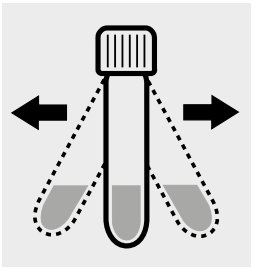


Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

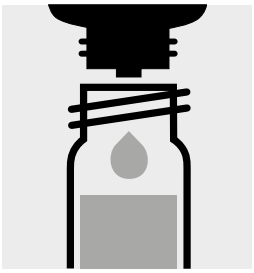
Place 1 level blue micro-spoon of **Cl_2-1** into a round cell.



Add 5.0 ml of the sample with pipette, close with the screw cap.

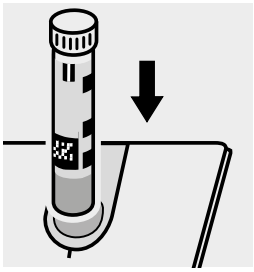


Shake the cell vigorously to dissolve the solid substance.



Add 2 drops of **Cl_2-2**, close the cell with the screw cap, and mix.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine

Differentiation between free chlorine and total chlorine

1.00597

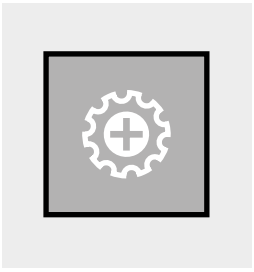
Cell Test

Measuring range: 0.03 – 6.00 mg/l Cl_2

After selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If the aim is to measure **only** free chlorine or total chlorine, the "Differentiation" mode must be deactivated again.

Select method no. **142**.

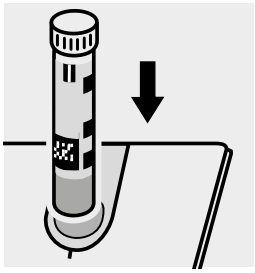


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **free chlorine** (see analytical procedure "Determination of free chlorine" with 1.00597).
= cell A

After the reaction time has expired:

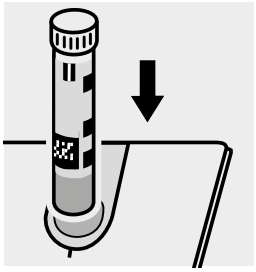


Place the **cell A** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **total chlorine** (see analytical procedure "Determination of total chlorine" with 1.00597).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.
The results A (Cl_2 (f)), B (Cl_2 (t)), and C (Cl_2 (b)) are shown in the display in mg/l.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

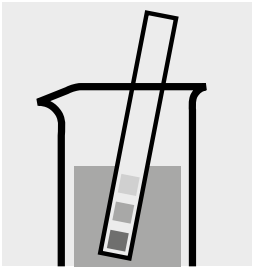
Chlorine

Determination of free chlorine

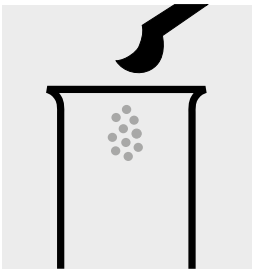
1.00598

Test

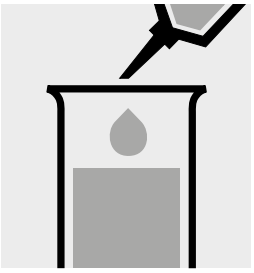
Measuring	0.05 – 6.00	mg/l Cl_2	10-mm cell
range:	0.02 – 3.00	mg/l Cl_2	20-mm cell
	0.010 – 1.000	mg/l Cl_2	50-mm cell
	Expression of results also possible in mmol/l.		



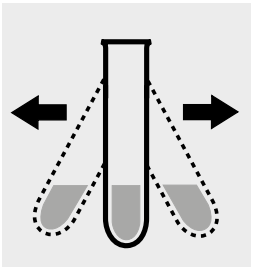
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 1 level blue micro-spoon of **Cl_2-1** into a test tube.

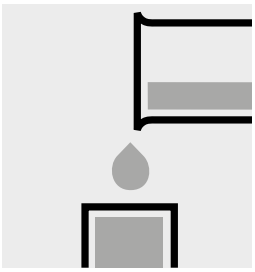


Add 10 ml of the sample with pipette.

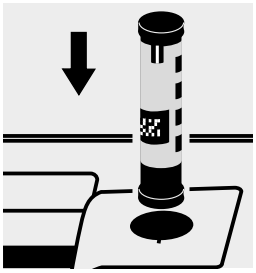


Shake vigorously to dissolve the solid substance.

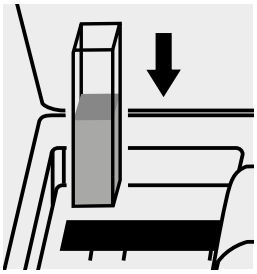
Reaction time: 1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

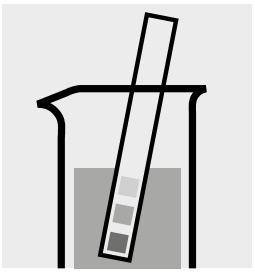
Chlorine

Determination of total chlorine

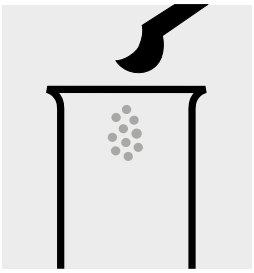
1.00602

Test

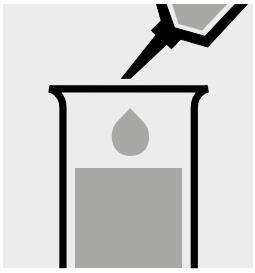
Measuring	0.05 – 6.00	mg/l Cl_2	10-mm cell
range:	0.02 – 3.00	mg/l Cl_2	20-mm cell
	0.010 – 1.000	mg/l Cl_2	50-mm cell
	Expression of results also possible in mmol/l.		



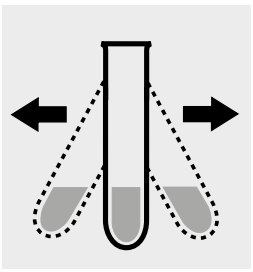
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



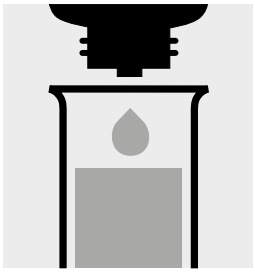
Place 1 level blue micro-spoon of **Cl_2-1** into a test tube.



Add 10 ml of the sample with pipette.

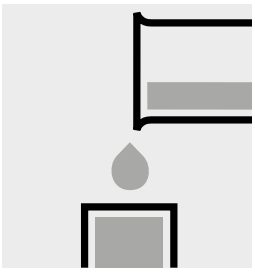


Shake vigorously to dissolve the solid substance.

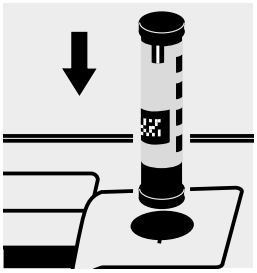


Add 2 drops of **Cl_2-2** and mix.

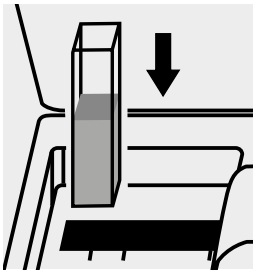
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard from Chloramine T GR can be used (see section "Standard solutions").

Chlorine

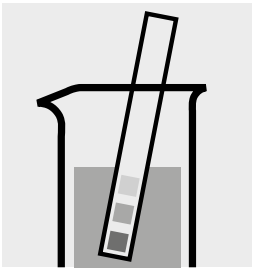
Determination of free chlorine and total chlorine

1.00599

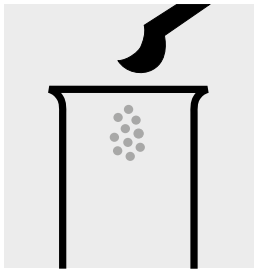
Test

Measuring	0.05 – 6.00	mg/l Cl_2	10-mm cell
range:	0.02 – 3.00	mg/l Cl_2	20-mm cell
	0.010 – 1.000	mg/l Cl_2	50-mm cell
	Expression of results also possible in mmol/l.		

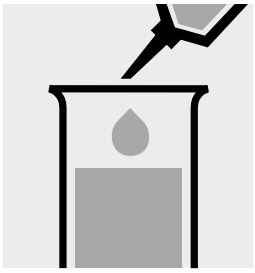
Determination of free chlorine



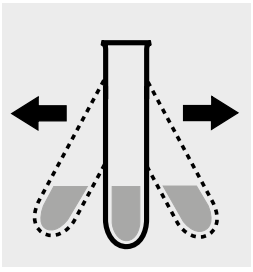
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 1 level blue micro-spoon of **Cl_2-1** into a test tube.

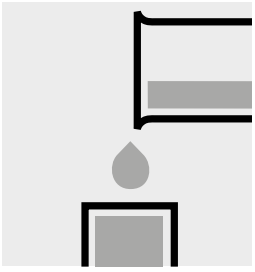


Add 10 ml of the sample with pipette.

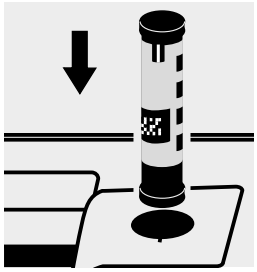


Shake vigorously to dissolve the solid substance.

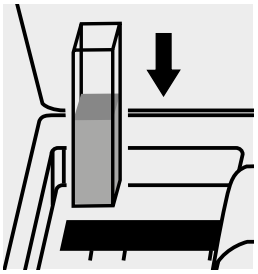
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

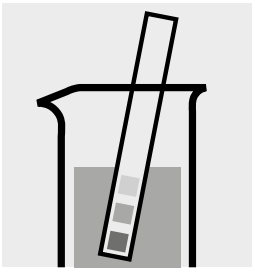
Chlorine

Determination of free chlorine and total chlorine

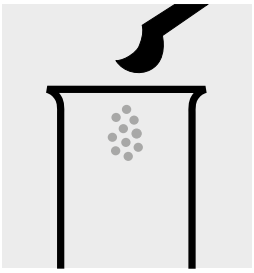
1.00599

Test

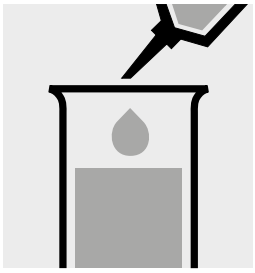
Determination of total chlorine



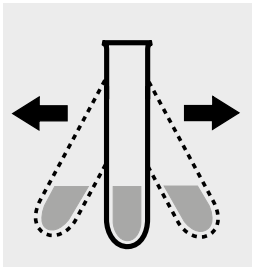
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



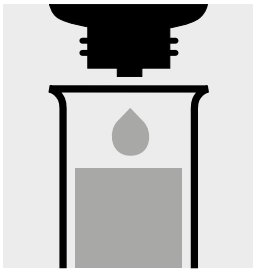
Place 1 level blue micro-spoon of **Cl_2-1** into a test tube.



Add 10 ml of the sample with pipette.

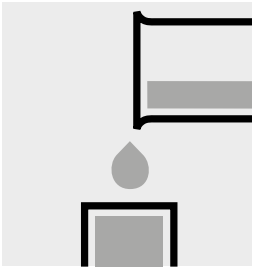


Shake vigorously to dissolve the solid substance.

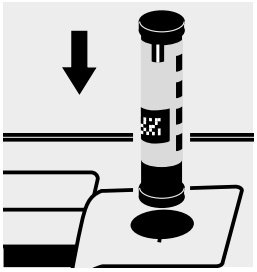


Add 2 drops of **Cl_2-2** and mix.

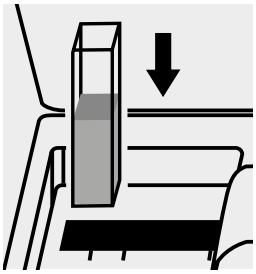
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine

Differentiation between free chlorine and total chlorine

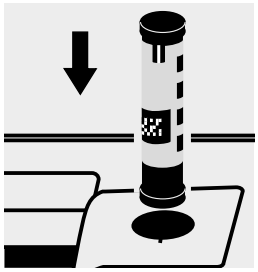
1.00599

Test

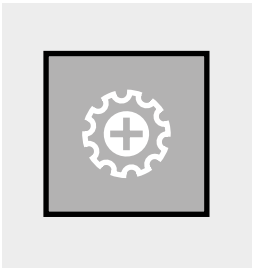
Measuring	0.05 – 6.00	mg/l Cl_2	10-mm cell
range:	0.02 – 3.00	mg/l Cl_2	20-mm cell
	0.010 – 1.000	mg/l Cl_2	50-mm cell

After selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If the aim is to measure **only** free chlorine or total chlorine, the "Differentiation" mode must be deactivated again.



Select method with AutoSelector.

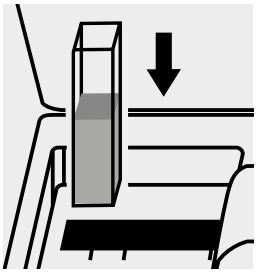


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **free chlorine** (see analytical procedure "Determination of free chlorine" with 1.00599).
= cell A

After the reaction time has expired:

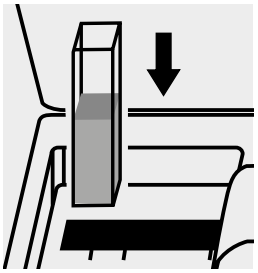


Place the **cell A** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **total chlorine** (see analytical procedure "Determination of total chlorine" with 1.00599).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Cl_2 (f)), B (Cl_2 (t)), and C (Cl_2 (b)) are shown in the display in mg/l.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine (with liquid reagents)

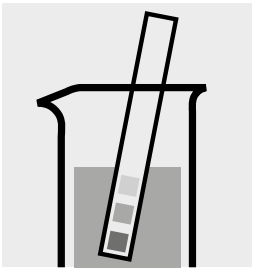
Determination of free chlorine and total chlorine

1.00086/1.00087/
1.00088/1.00089

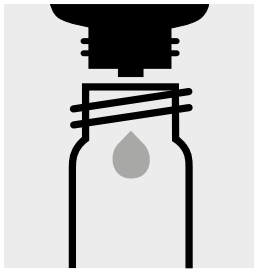
Cell Test

Measuring range:	0.03 – 6.00 mg/l Cl_2 Expression of results also possible in mmol/l.

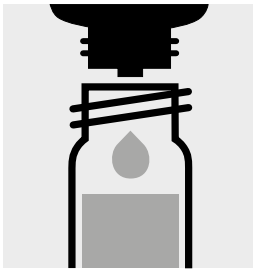
Determination of free chlorine



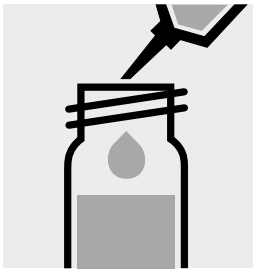
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 6 drops of **Cl_2-1** into a round cell.

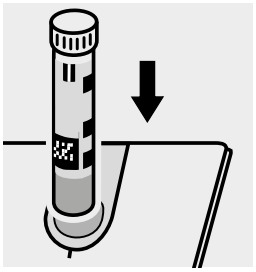


Add 3 drops of **Cl_2-2**, close with the screw cap, and mix.



Add 10 ml of the sample with pipette, close with the screw cap, and mix.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

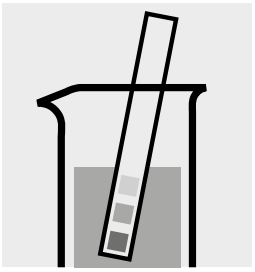
Chlorine (with liquid reagents)

Determination of free chlorine and total chlorine

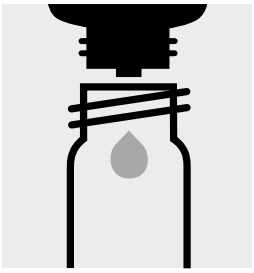
1.00086/1.00087/
1.00088/1.00089

Cell Test

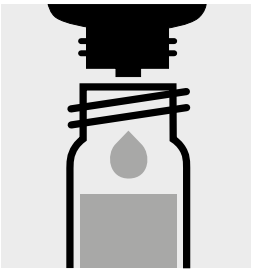
Determination of total chlorine



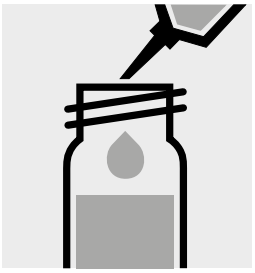
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 6 drops of **Cl_2-1** into a round cell.

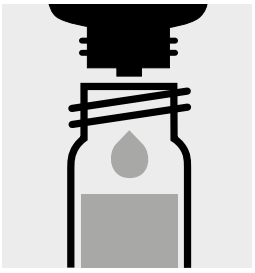


Add 3 drops of **Cl_2-2**, close with the screw cap, and mix.

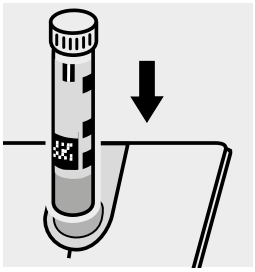


Add 10 ml of the sample with pipette, close with the screw cap, and mix.

Reaction time:
1 minute



Add 2 drops of **Cl_2-3**, close with the screw cap, and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine (with liquid reagents)

Differentiation between free chlorine and total chlorine

1.00086/1.00087/ 1.00088/1.00089

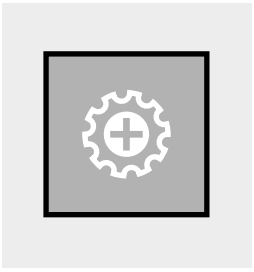
Cell Test

Measuring range: 0.03 – 6.00 mg/l Cl_2

After selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If the aim is to measure **only** free chlorine or total chlorine, the "Differentiation" mode must be deactivated again.

Select method no. **194**.

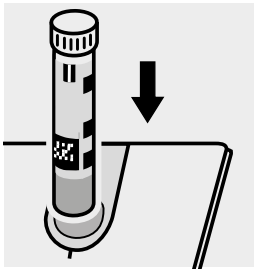


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **free chlorine** (see analytical procedure "Determination of free chlorine" with 1.00086/ 1.00087/1.00088/ 1.00089).
= cell A

After the reaction time has expired:

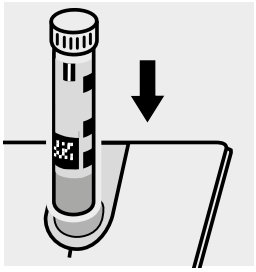


Place the **cell A** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **total chlorine** (see analytical procedure "Determination of total chlorine" with 1.00086/ 1.00087/1.00088/ 1.00089).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.
The results A (Cl_2 (f)), B (Cl_2 (t)), and C (Cl_2 (b)) are shown in the display in mg/l.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine (with liquid reagents)

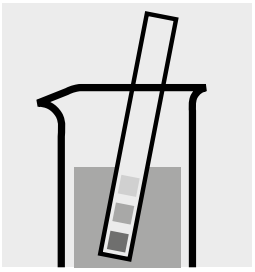
Detemination of free chlorine and total chlorine

1.00086/1.00087/ 1.00088

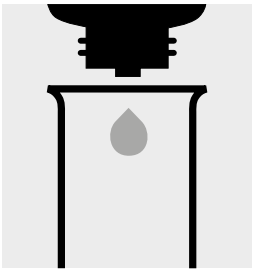
Test

Measuring range:	0.010 – 1.000 mg/l Cl_2	50-mm cell
	Expression of results also possible in mmol/l.	

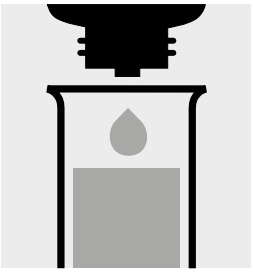
Determination of free chlorine



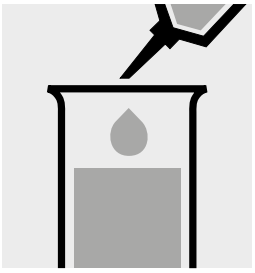
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 6 drops of **Cl_2-1** into a test tube.

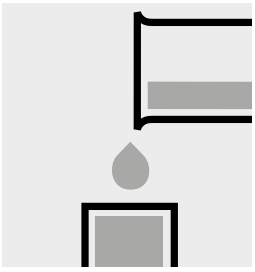


Add 3 drops of **Cl_2-2**, close with the screw cap, and mix.

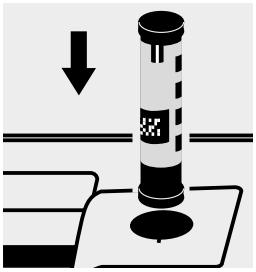


Add 10 ml of the sample with pipette, close with the screw cap, and mix.

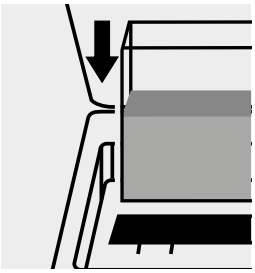
Reaction time: 1 minute



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

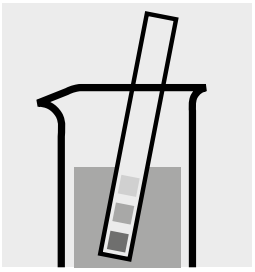
Chlorine (with liquid reagents)

Detemination of free chlorine and total chlorine

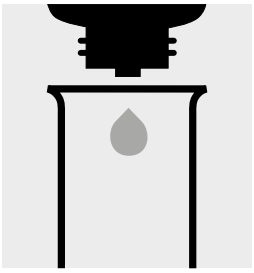
1.00086/1.00087/ 1.00088

Test

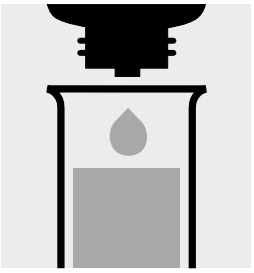
Determination of total chlorine



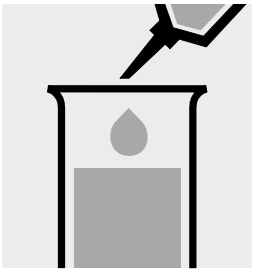
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 6 drops of **Cl_2-1** into a test tube.

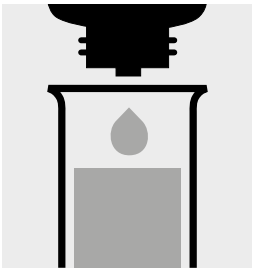


Add 3 drops of **Cl_2-2**, close with the screw cap, and mix.

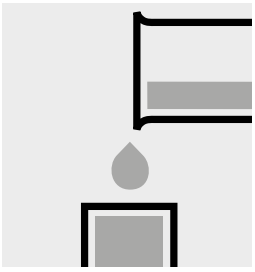


Add 10 ml of the sample with pipette, close with the screw cap, and mix.

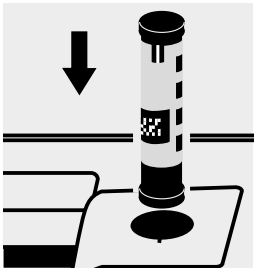
Reaction time: 1 minute



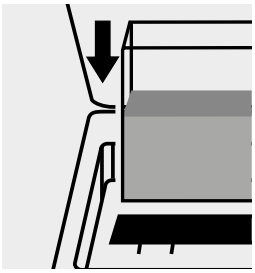
Add 2 drops of **Cl_2-3**, close with the screw cap, and mix.



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine (with liquid reagents)

Differentiation between free chlorine and total chlorine

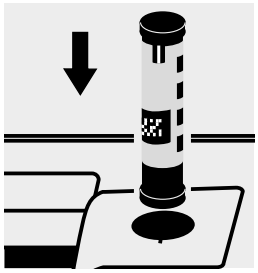
1.00086/1.00087/ 1.00088

Test

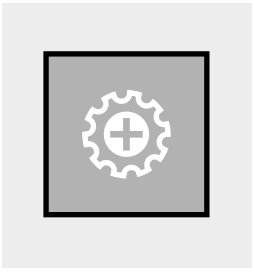
Measuring range: 0.010 – 1.000 mg/l Cl_2 50-mm cell

After selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If the aim is to measure **only** free chlorine or total chlorine, the "Differentiation" mode must be deactivated again.



Select method with AutoSelector.

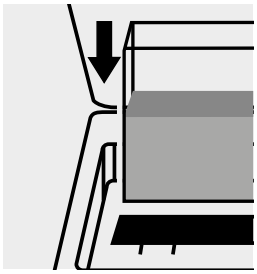


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **free chlorine** (see analytical procedure "Determination of free chlorine" with 1.00086/ 1.00087/1.00088).
= cell A

After the reaction time has expired:

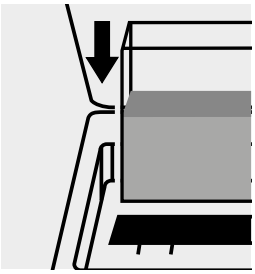


Place the **cell A** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **total chlorine** (see analytical procedure "Determination of total chlorine" with 1.00086/ 1.00087/1.00088).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Cl_2 (f)), B (Cl_2 (t)), and C (Cl_2 (b)) are shown in the display in mg/l.

Important:

Very high chlorine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).
After each determination of total chlorine rinse the cell with sulfuric acid 25 % and subsequently several times with distilled water.

Quality assurance:

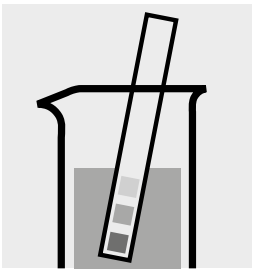
To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Chlorine Dioxide

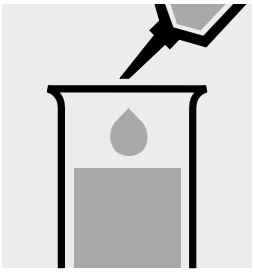
1.00608

Test

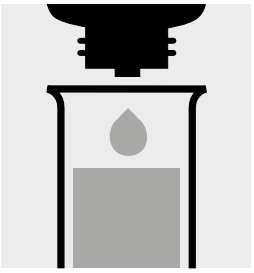
Measuring range:	0.10 – 10.00 mg/l ClO_2	10-mm cell
	0.05 – 5.00 mg/l ClO_2	20-mm cell
	0.020 – 2.000 mg/l ClO_2	50-mm cell
	Expression of results also possible in mmol/l.	



Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

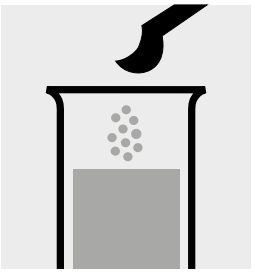


Pipette 10 ml of the sample into a test tube.

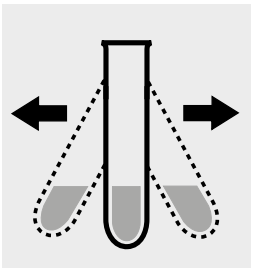


Add 2 drops of **ClO_2-1** and mix.

Reaction time:
2 minutes

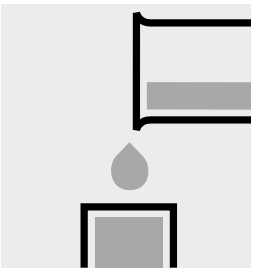


Add 1 level blue micro-spoon of **ClO_2-2.**

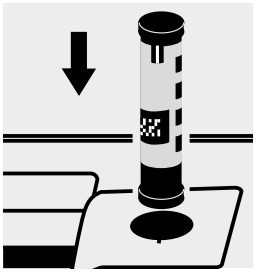


Shake vigorously to dissolve the solid substance.

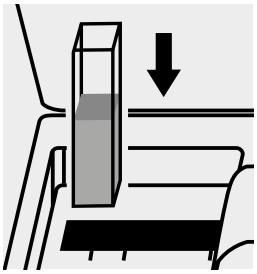
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high chlorine dioxide concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

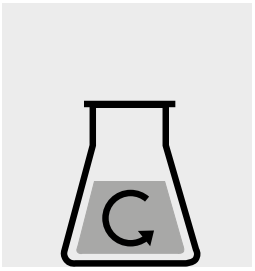
Chlorophyll

Determination of chlorophyll-a and phaeophytin

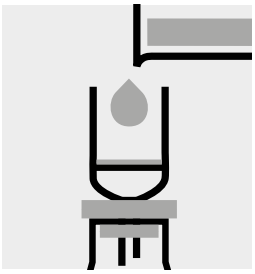
corresponds to **DIN 38412** and **ISO 10260**

Application

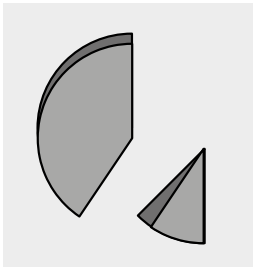
Measuring range:	depending on the ratio of original sample to extract	10-mm cell	Method No. 2509
	in µg/l Chl-a or Phaeo	20-mm cell	Method No. 2509
		50-mm cell	Method No. 2509



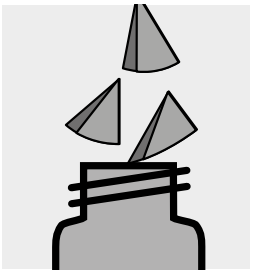
Sufficiently homogenize 0.5 – 2 l of sample. **Note the sample volume.**



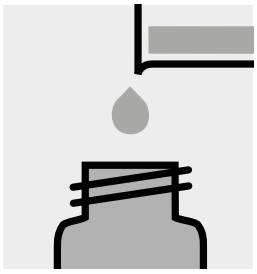
Filter the sample through a suitable filter (e. g. glass-fibre filter).



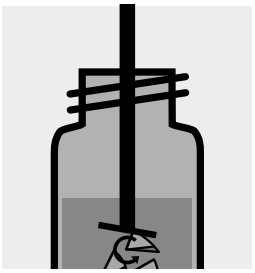
Fold the loaded filter and tear into small pieces.



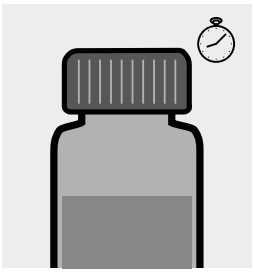
Place the pieces of the filter in an extraction vessel (e. g. 100-ml amber glass bottle).



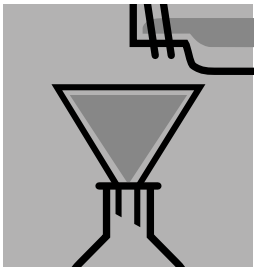
Add approx. 30 ml of boiling **ethanol** (w = 90 %) and allow to cool to room temperature.



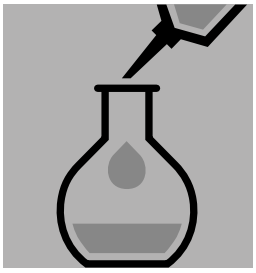
Disintegrate the filter in the homogenizer. Rinse together with a small portion of ethanol.



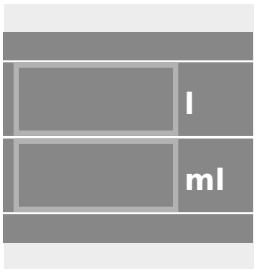
Allow to stand for 6 - 24 hours for the extraction to take place.



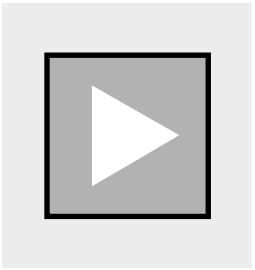
Filter the extract **protected from light** through a paper filter ("Blauband") into a volumetric flask (for DIN 38412: 100 ml). Rinse the filter with a small portion of ethanol.



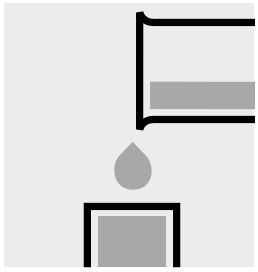
Make the contents of the volumetric flask up to the mark with ethanol, keeping them **protected from light** in the process!



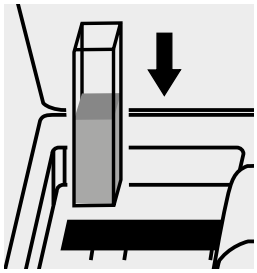
Select method no. **2509**. Enter the volumes of the original sample in liters and extract (volumetric flask) in milliliters.



Tap the <Start> button.

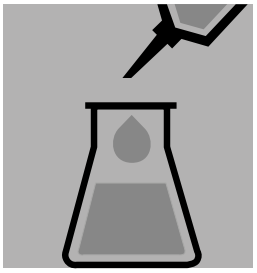


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.



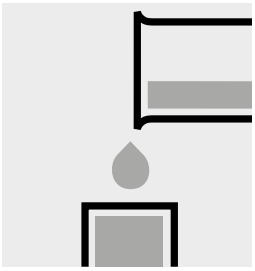
Acidify a portion of the extract with **hydrochloric acid 2 mol/l Titripur®** (Cat. No. 1.09063) (0.3 ml per 100 ml of extract).

Chlorophyll

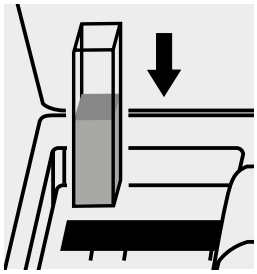
Determination of chlorophyll-a and phaeophytin

corresponds to **DIN 38412** and **ISO 10260**

Application



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The chlorophyll-a and phaeophytin content is shown in the display in µg/l.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

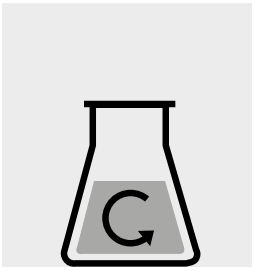
Chlorophyll

Determination of chlorophyll-a and phaeophytin

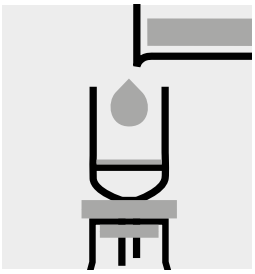
analogous to **APHA 10200-H**

Application

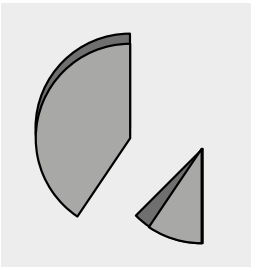
Measuring range:	depending on the ratio of original sample to extract	10-mm cell	Method No. 2504
	in mg/m³ Chl-a or Phaeo	20-mm cell	Method No. 2504
		50-mm cell	Method No. 2504



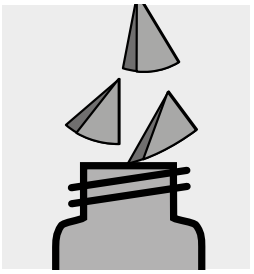
Sufficiently homogenize the sample. **Note the sample volume.**



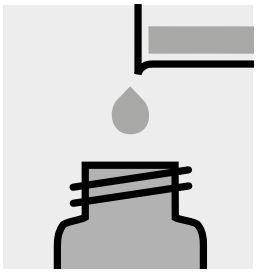
Filter the sample through a suitable filter (e. g. glass-fibre filter).



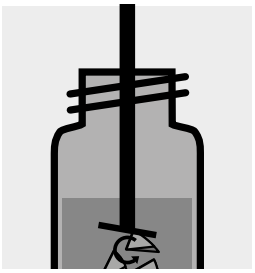
Fold the loaded filter and tear into small pieces.



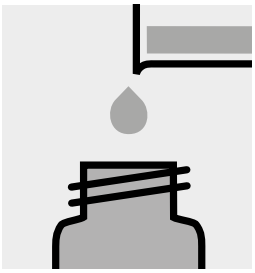
Place the pieces of the filter in an extraction vessel (**protected from light**).



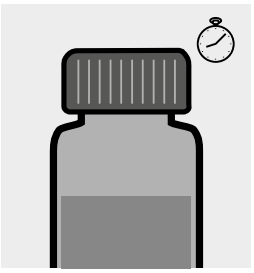
Add 2 - 3 ml of **extracting agent**.



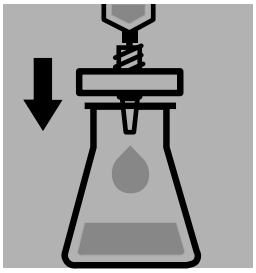
Disintegrate the filter in the homogenizer.



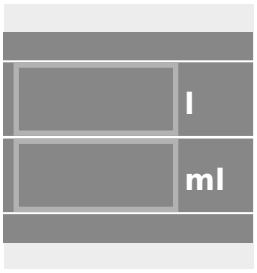
Make up to 10 ml with **extracting agent**.



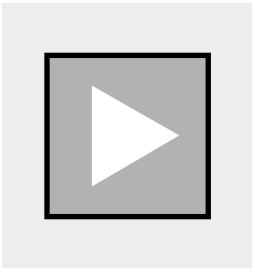
Allow to stand at +4 °C for at least 2 hours for the extraction to take place.



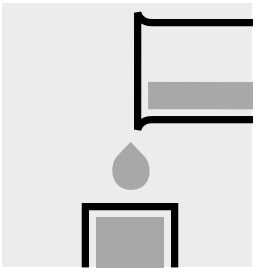
Filter the extract **protected from light** through a suitable filter.



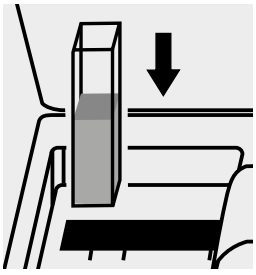
Select method no. **2504**. Enter the volumes of the original sample in liters and extract in milliliters (here: 10 ml).



Tap the <Start> button.

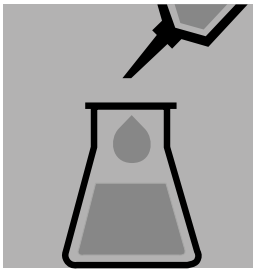


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.



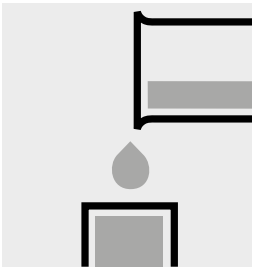
Acidify a portion of the extract with **hydrochloric acid 0.1 mol/l Titripur®** (Cat. No. 1.09060) (0.15 ml per 5 ml of extract).

Chlorophyll

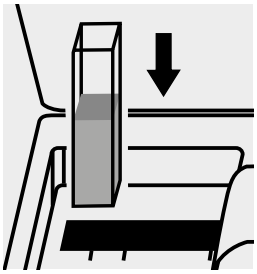
Determination of chlorophyll-a and phaeophytin

analogous to **APHA 10200-H**

Application



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The chlorophyll-a and phaeophytin content is shown in the display in mg/m^3.

Important:

The exact procedure and the composition and preparation of the extraction agent used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

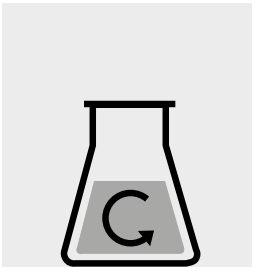
Chlorophyll

Determination of chlorophyll-a and phaeophytin

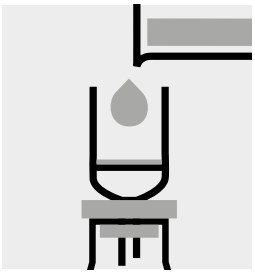
analogous to **ASTM D3731 - 87**

Application

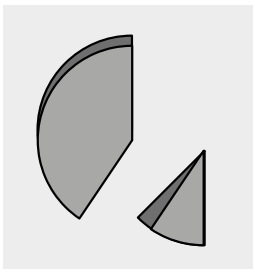
Measuring range:	depending on the ratio of original sample to extract	10-mm cell	Method No. 2504
	in mg/m³ Chl-a or Phaeo	20-mm cell	Method No. 2504
		50-mm cell	Method No. 2504



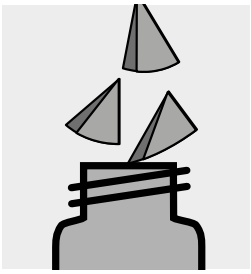
Homogenize the sample, stabilized with magnesiumcarbonate, to a sufficient degree. **Note the sample volume.**



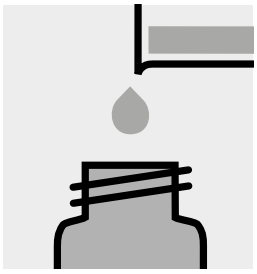
Filter the sample through a suitable filter (e. g. glass-fibre filter).



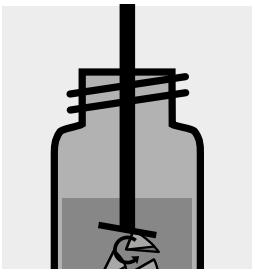
Fold the loaded filter and tear into small pieces.



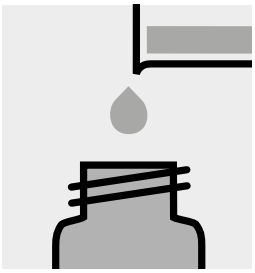
Place the pieces of the filter in an extraction vessel (**protected from light**).



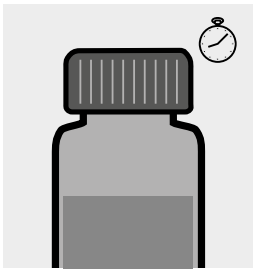
Add 2 - 3 ml of **extracting agent**.



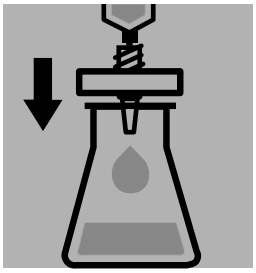
Disintegrate the filter in the homogenizer.



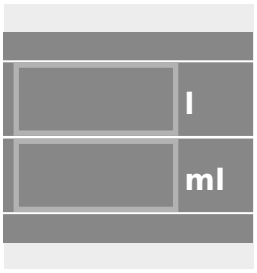
Make up to 10 ml with **extracting agent**.



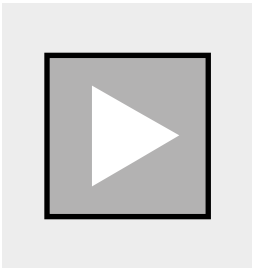
Allow to stand at +4 °C for 0.25 - 24 hours for the extraction to take place.



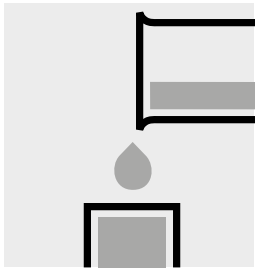
Filter the extract **protected from light** through a suitable filter.



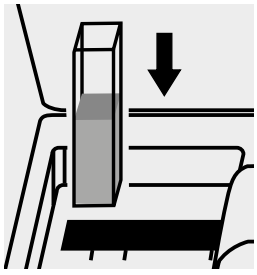
Select method no. **2504**. Enter the volumes of the original samplein liters and extract in milliliters (here: 10 ml).



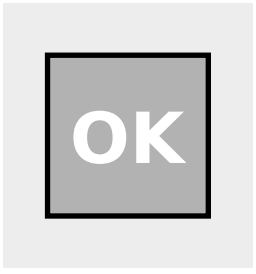
Tap the <Start> button.



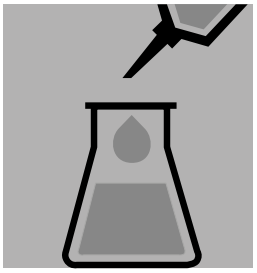
Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Confirm with <OK>.



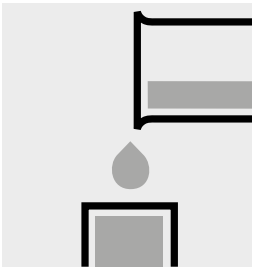
Acidify a portion of the extract with **hydrochloric acid 1 mol/l Titripur®** (Cat. No. 1.09057) (50 µl per 5 ml of extract).

Chlorophyll

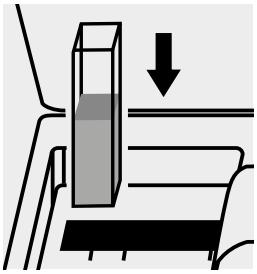
Determination of chlorophyll-a and phaeophytin

analogous to **ASTM D3731 - 87**

Application



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The chlorophyll-a and phaeophytin content is shown in the display in mg/m^3.

Important:

The exact procedure and the composition and preparation of the extraction agent used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

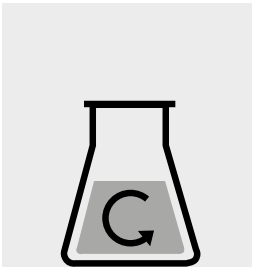
Chlorophyll-a, -b, -c

(Trichromatic Method)

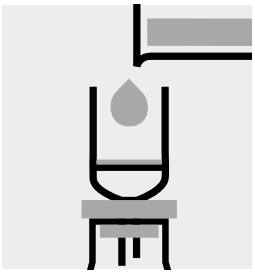
analogous to **APHA 10200-H**

Application

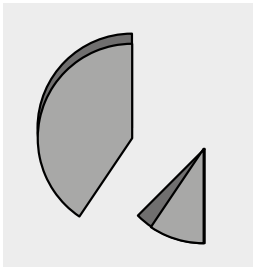
Measuring range:	depending on the ratio of original sample to extract in mg/m³ Chl-a, -b, -c	10-mm cell 50-mm cell	Method No. 2507 Method No. 2507



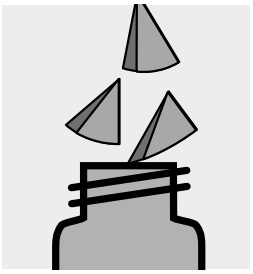
Sufficiently homogenize the sample. **Note the sample volume.**



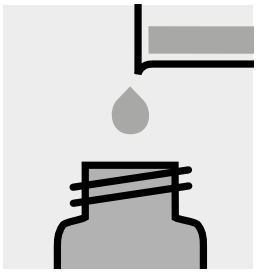
Filter the sample through a suitable filter (e. g. glass-fibre filter).



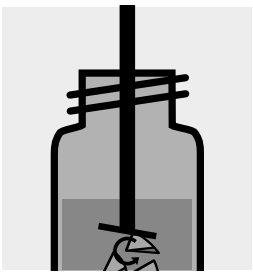
Fold the loaded filter and tear into small pieces.



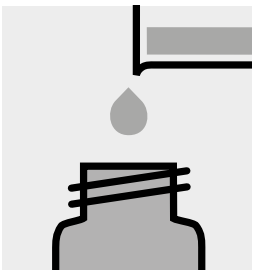
Place the pieces of the filter in an extraction vessel (**protected from light**).



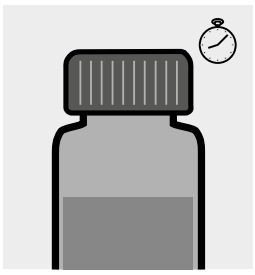
Add 2 - 3 ml of **extracting agent**.



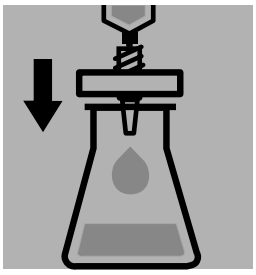
Disintegrate the filter in the homogenizer.



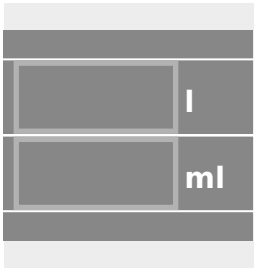
Make up to 10 ml with **extracting agent**.



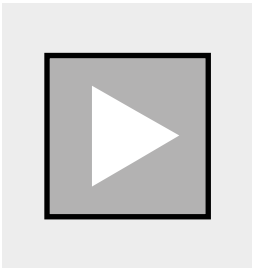
Allow to stand at +4 °C for at least 2 hours for the extraction to take place.



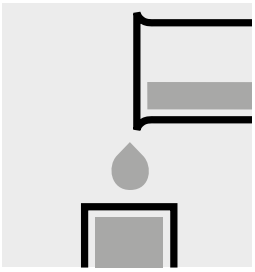
Filter the extract **protected from light** through a suitable filter.



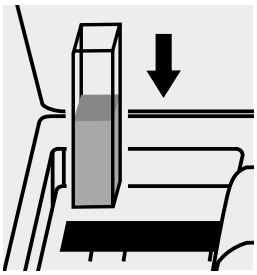
Select method no. **2507**. Enter the volumes of the original sample in liters and extract in milliliters (here: 10 ml).



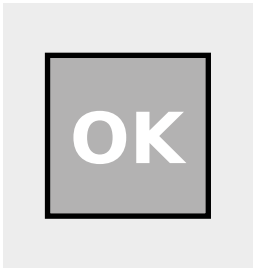
Tap the <Start> button.



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Tap the <OK> button.

Confirm with <OK>. The chlorophyll-a, chlorophyll-b, and chlorophyll-c contents are shown in the display in mg/m³.

Important:

The exact procedure and the composition and preparation of the extraction agent used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

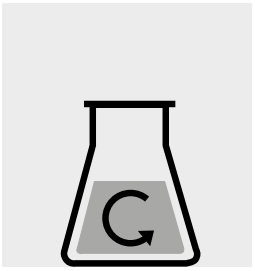
Chlorophyll-a, -b, -c

(Trichromatic Method)

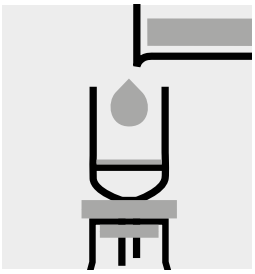
analogous to **ASTM D3731 - 87**

Application

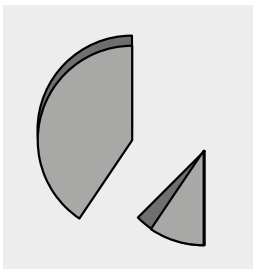
Measuring	depending on the ratio of original sample to extract	10-mm cell	Method No. 2507
range:	in mg/m³ Chl-a, -b, -c	50-mm cell	Method No. 2507



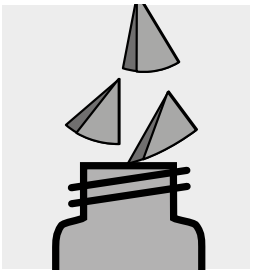
Homogenize the sample, stabilized with magnesiumcarbonate, to a sufficient degree. **Note the sample volume.**



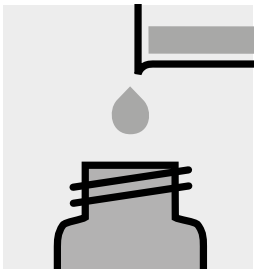
Filter the sample through a suitable filter (e. g. glass-fibre filter).



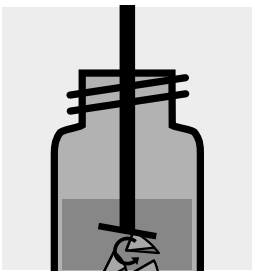
Fold the loaded filter and tear into small pieces.



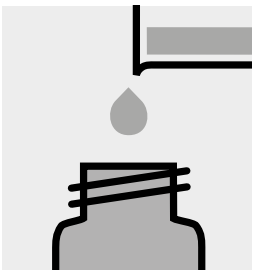
Place the pieces of the filter in an extraction vessel (**protected from light**).



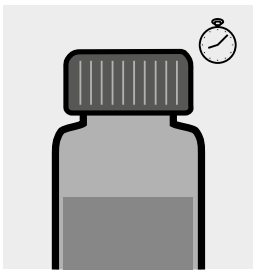
Add 2 - 3 ml of **extracting agent**.



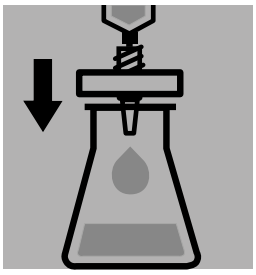
Disintegrate the filter in the homogenizer.



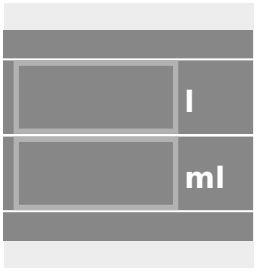
Make up to 10 ml with **extracting agent**.



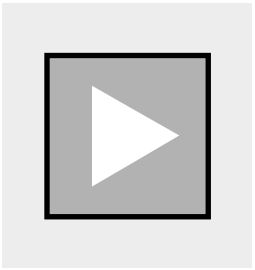
Allow to stand at +4 °C for 0.25 - 24 hours for the extraction to take place.



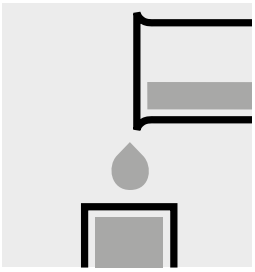
Filter the extract **protected from light** through a suitable filter.



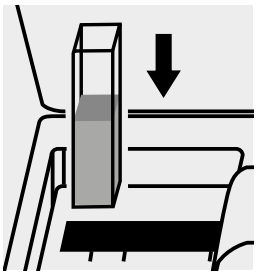
Select method no. **2507**. Enter the volumes of the original sample in liters and extract in milliliters (here: 10 ml).



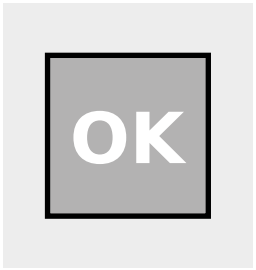
Tap the <Start> button.



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Tap the <OK> button.

Confirm with <OK>.
The chlorophyll-a, chlorophyll-b, and chlorophyll-c contents are shown in the display in mg/m³.

Important:

The exact procedure and the composition and preparation of the extraction agent used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

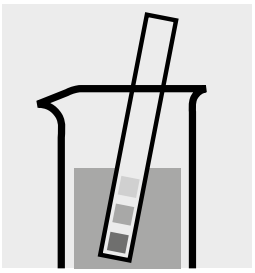
Chromate

Determination of chromium(VI)

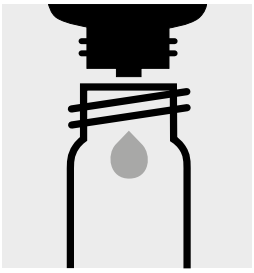
1.14552

Cell Test

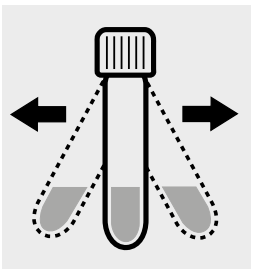
Measuring range:	0.05 – 2.00 mg/l Cr
	0.11 – 4.46 mg/l CrO_4
	Expression of results also possible in mmol/l.



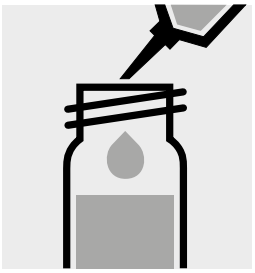
Check the pH of the sample, specified range: pH 1 – 9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Add 6 drops of **Cr-3K** into a reaction cell, close with the screw cap.

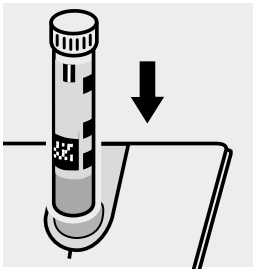


Shake the cell vigorously to dissolve the solid substance and leave to stand for **1 minute**.



Add 5.0 ml of the sample with pipette, close the cell with the screw cap, and mix.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use chromate standard solution Certipur®, Cat.No. 1.19780, concentration 1000 mg/l CrO_4^{2-}, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.33013.

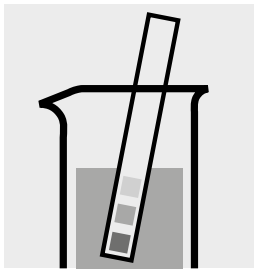
Chromate

Determination of total chromium
= sum of chromium(VI) and chromium(III)

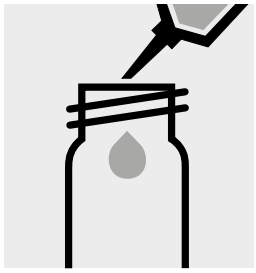
1.14552

Cell Test

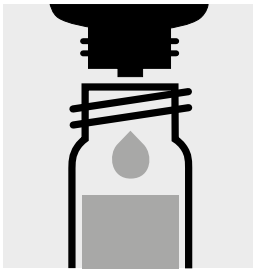
Measuring range:	0.05 – 2.00 mg/l Cr
	0.11 – 4.46 mg/l CrO_4
	Expression of results also possible in mmol/l.



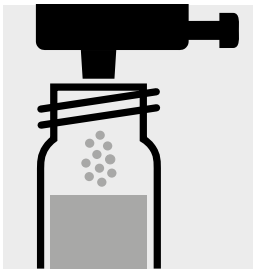
Check the pH of the sample, specified range: pH 1 – 9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



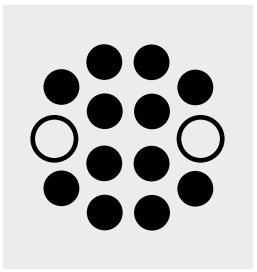
Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).



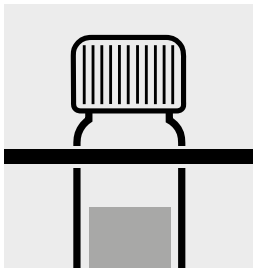
Add 1 drop of **Cr-1K**, close with the screw cap, and mix.



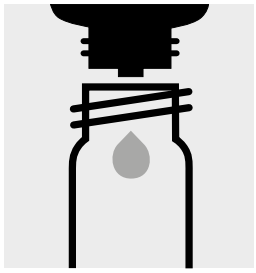
Add 1 dose of **Cr-2K** using the blue dose-metering cap, close the reaction cell with the screw cap.



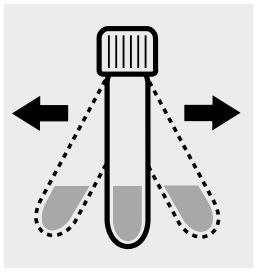
Heat the cell in the thermoreactor at 120 °C for 1 hour.



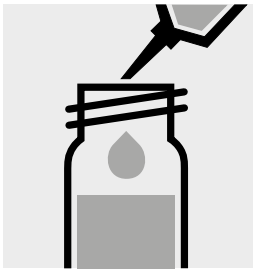
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature: **pretreated sample**.



Add 6 drops of **Cr-3K** into a reaction cell, close the cell with the screw cap.

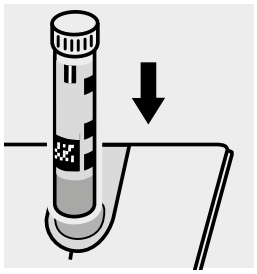


Shake the cell vigorously to dissolve the solid substance and leave to stand for **1 minute**.



Add 5.0 ml of the **pretreated sample** with pipette, close with the screw cap, and mix.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use chromate standard solution Certipur®, Cat.No. 1.19780, concentration 1000 mg/l CrO_4^{2-}, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.33013.

Chromate

Differentiation between chromium(VI) and chromium(III)

1.14552

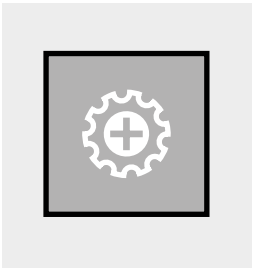
Cell Test

Measuring range:	0.05 – 2.00 mg/l Cr 0.11 – 4.46 mg/l CrO_4

If the aim is to differentiate between chromium(VI) and chromium(III), after selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **39**.

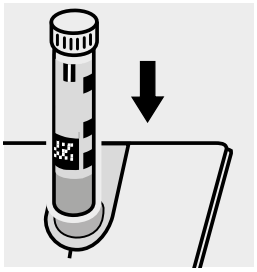


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **total chromium** (see analytical procedure "Determination of total chromium" with 1.14552).
= cell A

After the reaction time has expired:

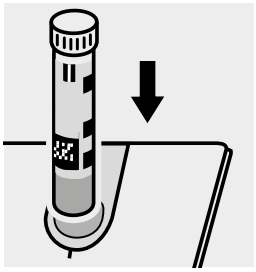


Place the **cell A** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **chromium(VI)** (see analytical procedure "Determination of chromium(VI)" with 1.14552).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.
The results A (Σ Cr), B (Cr(VI)), and C (Cr(III)) are shown in the display in mg/l.

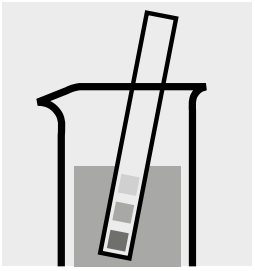
Chromate

Determination of chromium(VI)

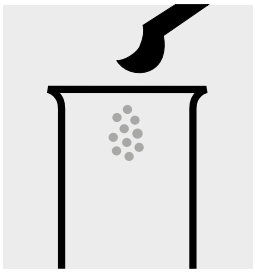
1.14758

Test

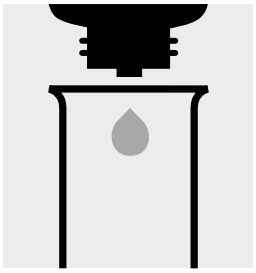
Measuring	0.05 – 3.00 mg/l Cr	0.11 – 6.69 mg/l CrO_4	10-mm cell
range:	0.03 – 1.50 mg/l Cr	0.07 – 3.35 mg/l CrO_4	20-mm cell
	0.010 – 0.600 mg/l Cr	0.02 – 1.34 mg/l CrO_4	50-mm cell
	Expression of results also possible in mmol/l.		



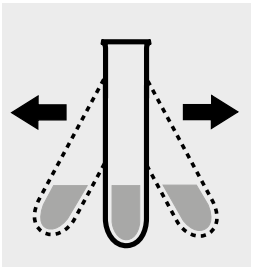
Check the pH of the sample, specified range: pH 1 – 9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



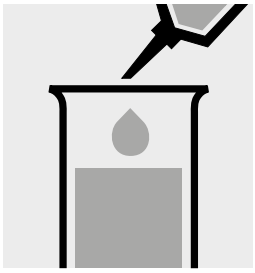
Place 1 level grey micro-spoon of **Cr-1** into a dry test tube.



Add 6 drops of **Cr-2**.

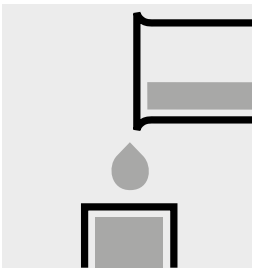


Shake the test tube vigorously to dissolve the solid substance.

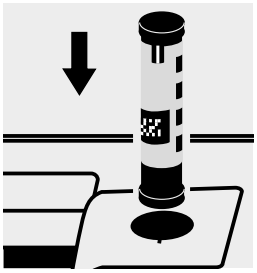


Add 5.0 ml of the sample with pipette and mix.

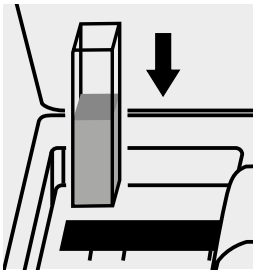
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total chromium = sum of chromium(VI) and chromium(III)** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of chromium (Σ Cr).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

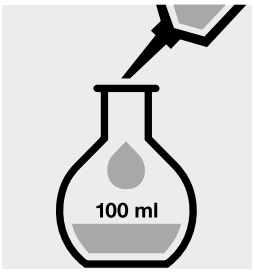
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use chromate standard solution Certipur®, Cat.No. 1.19780, concentration 1000 mg/l CrO_4^{2-}, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.33012 and 1.33013.

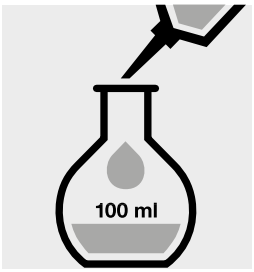
Chromium in electroplating baths

Inherent color

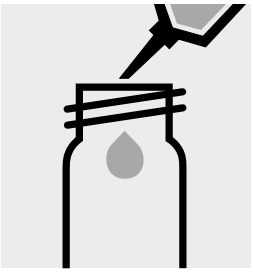
Measuring	20 – 400	g/l CrO_3	10-mm cell	Method No. 20
range:	10 – 200	g/l CrO_3	20-mm cell	Method No. 20
	4.0 – 80.0	g/l CrO_3	50-mm cell	Method No. 20



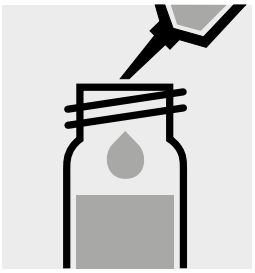
Pipette 5.0 ml of the sample into a 100-ml volumetric flask, fill to the mark with distilled water and mix thoroughly.



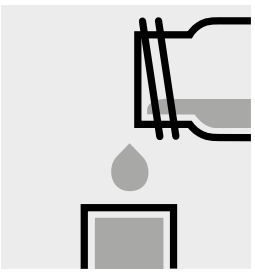
Pipette 4.0 ml of the dilute sample into a 100-ml volumetric flask, fill to the mark with distilled water and mix thoroughly.



Pipette 5.0 ml of the 1:500 dilute sample into an empty round cell (Empty cells, Cat. No. 1.14724).

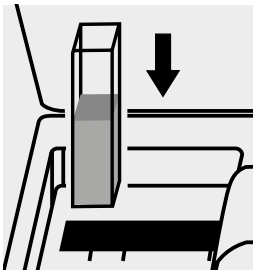


Add 5.0 ml of **sulfuric acid 40 %**, close the cell with the screw cap, and mix.



Transfer the solution into a corresponding cell.

Select method no. **20**.



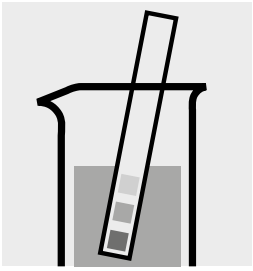
Place the cell into the cell compartment. The measurement is performed automatically.

Cobalt

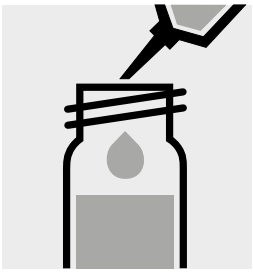
1.17244

Cell Test

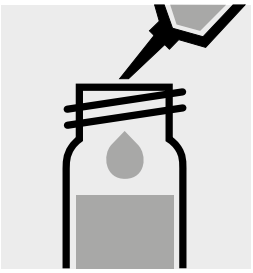
Measuring range:	0.05 – 2.00 mg/l Co Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 2.5 – 7.5.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.

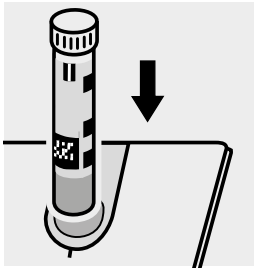


Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 0.5 ml of **Co-1K** with pipette, close with the screw cap, and mix.

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

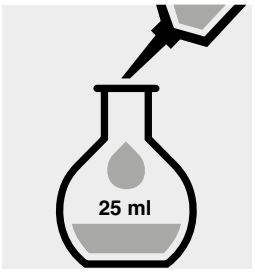
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use cobalt standard solution Certipur®, Cat.No. 1.19785, concentration 1000 mg/l Co, can be used after diluting accordingly.

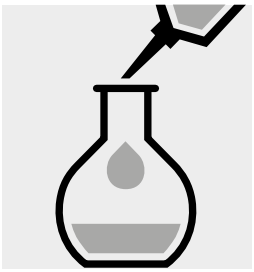
Cobalt in water

Application

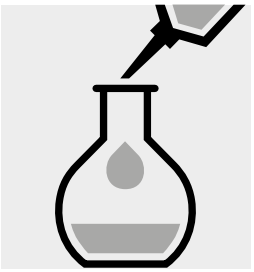
Measuring range:	0.5 – 10.0 mg/l Co	10-mm cell	Method No. 305
Attention!	The measurement is carried out at 495 nm in a 10-mm rectangular cell against a blank, prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and the reagents in an analogous manner.		



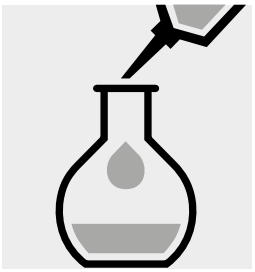
Pipette 10 ml of the sample into a 25-ml volumetric flask, fill to the mark with distilled water and mix thoroughly.



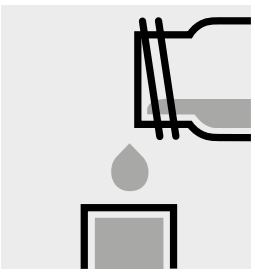
Add 0.25 ml of **reagent 1** with pipette.



Add 2.0 ml of **reagent 2** with pipette.

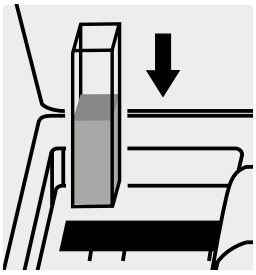


Add 1.0 ml of **reagent 3** with pipette, fill to the mark with distilled water, and mix thoroughly.



Transfer the solution into a cell.

Select method no. **305**.



Place the cell into the cell compartment. The measurement is performed automatically.

Important:

The exact composition and preparation of the reagents 1, 2, and 3 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

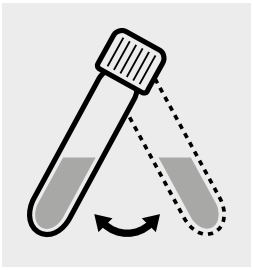
COD

Chemical Oxygen Demand

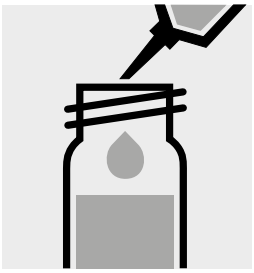
1.14560

Cell Test

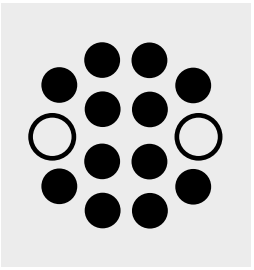
Measuring range:	4.0 – 40.0 mg/l COD or O_2 Expression of results also possible in mmol/l.



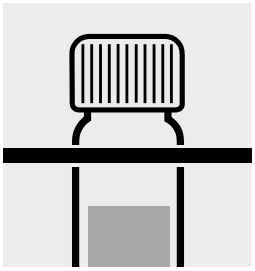
Suspend the bottom sediment in the cell by swirling.



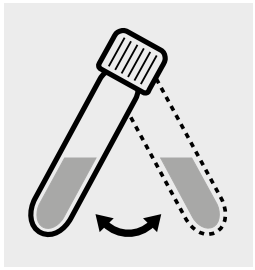
Carefully pipette 3.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



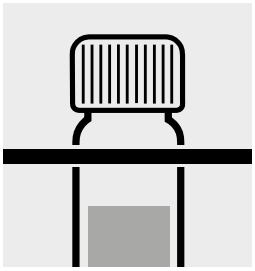
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



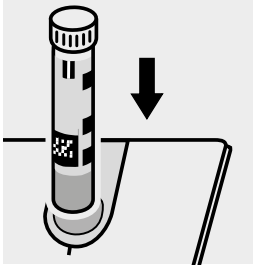
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solution for photometric applications, Cat.No. 1.25028.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

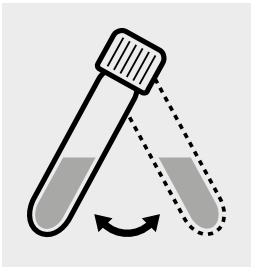
COD

Chemical Oxygen Demand

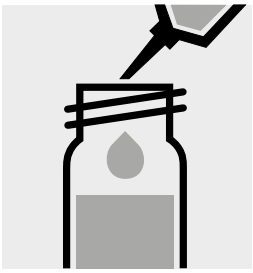
1.01796

Cell Test

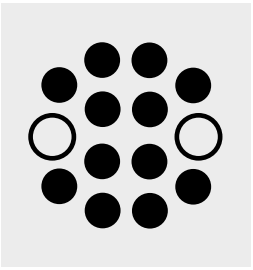
Measuring range:	5.0 – 80.0 mg/l COD or O_2 Expression of results also possible in mmol/l.



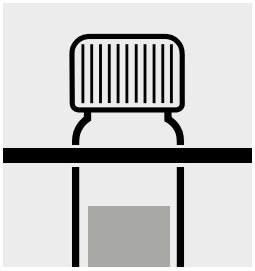
Suspend the bottom sediment in the cell by swirling.



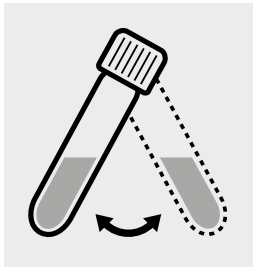
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



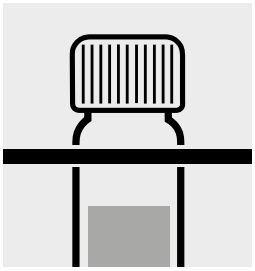
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



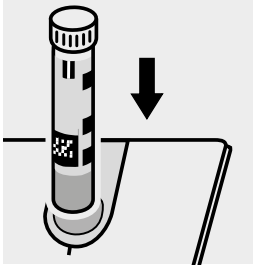
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solution for photometric applications, Cat.No. 1.25028.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

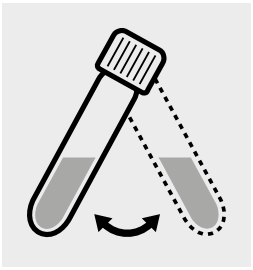
COD

Chemical Oxygen Demand

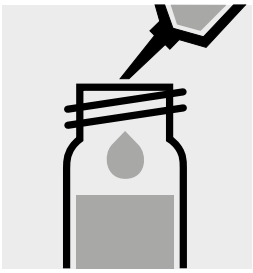
1.14540

Cell Test

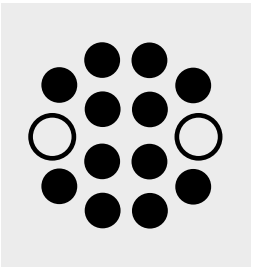
Measuring range:	10 – 150 mg/l COD or O_2 Expression of results also possible in mmol/l.



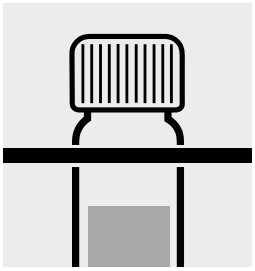
Suspend the bottom sediment in the cell by swirling.



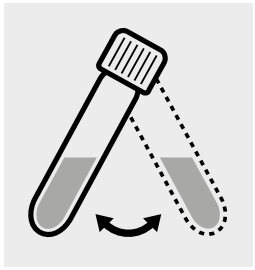
Carefully pipette 3.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



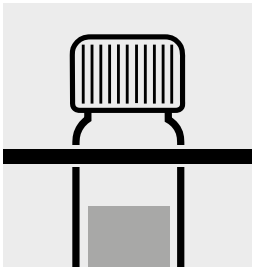
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



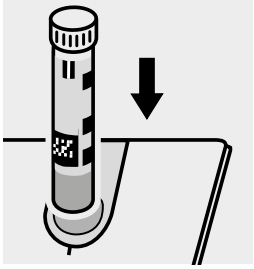
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solution for photometric applications, Cat.No. 1.25029.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

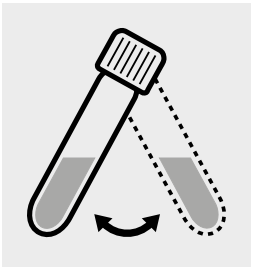
COD

Chemical Oxygen Demand

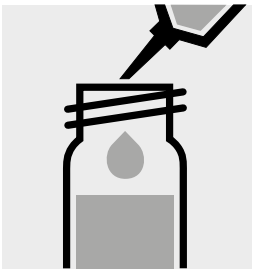
1.14895

Cell Test

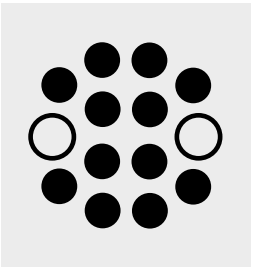
Measuring range:	15 – 300 mg/l COD or O_2 Expression of results also possible in mmol/l.



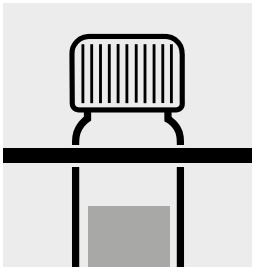
Suspend the bottom sediment in the cell by swirling.



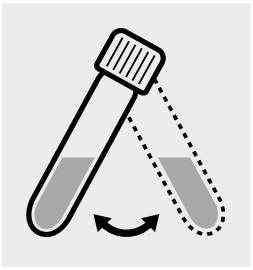
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



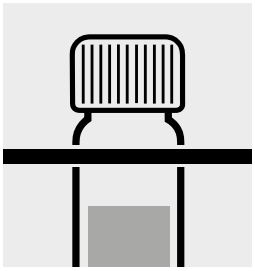
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



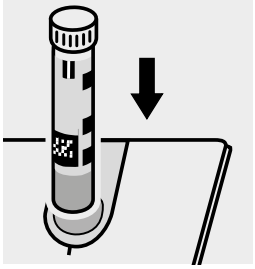
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 60, Cat.No. 1.14696, or the Standard solutions for photometric applications, Cat.Nos. 1.25029 and 1.25030.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 60) is highly recommended.

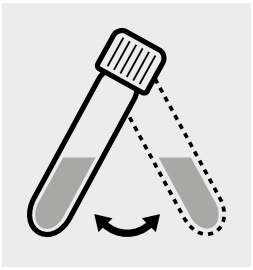
COD

Chemical Oxygen Demand

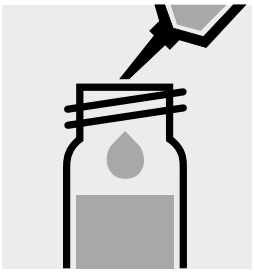
1.14690

Cell Test

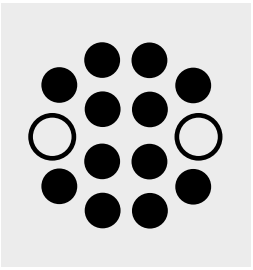
Measuring range:	50 – 500 mg/l COD or O_2 Expression of results also possible in mmol/l.



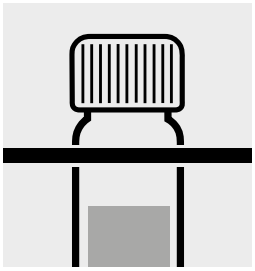
Suspend the bottom sediment in the cell by swirling.



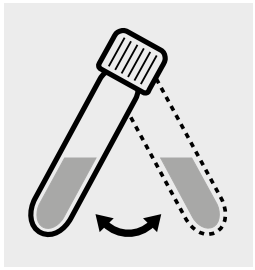
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



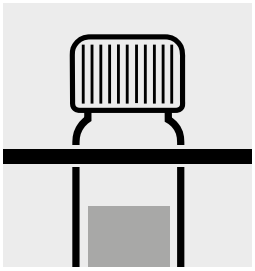
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



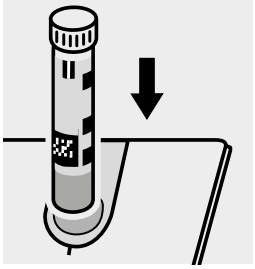
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 60, Cat.No. 1.14696, or the Standard solutions for photometric applications, Cat.Nos. 1.25029, 1.25030, and 1.25031.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 60) is highly recommended.

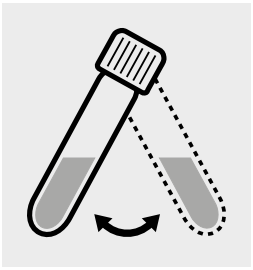
COD

Chemical Oxygen Demand

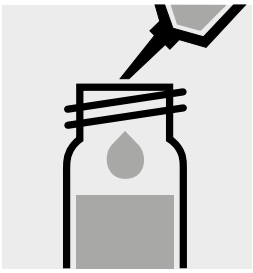
1.14541

Cell Test

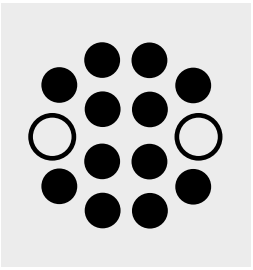
Measuring range:	25 – 1500 mg/l COD or O_2 Expression of results also possible in mmol/l.



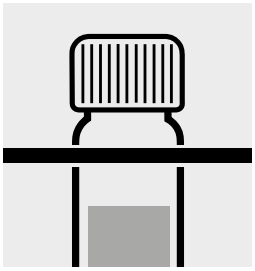
Suspend the bottom sediment in the cell by swirling.



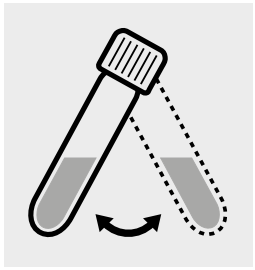
Carefully pipette 3.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



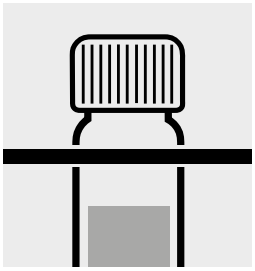
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



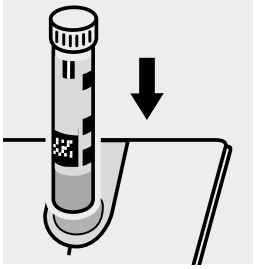
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25029, 1.25030, 1.25031, and 1.25032.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

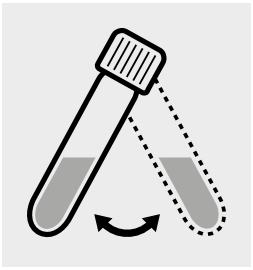
COD

Chemical Oxygen Demand

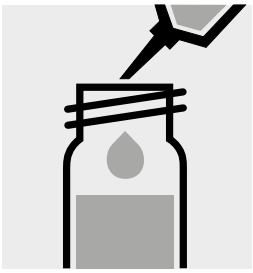
1.14691

Cell Test

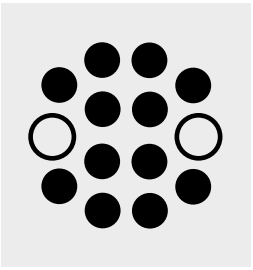
Measuring range:	300 – 3500 mg/l COD or O_2 Expression of results also possible in mmol/l.



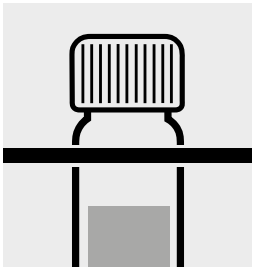
Suspend the bottom sediment in the cell by swirling.



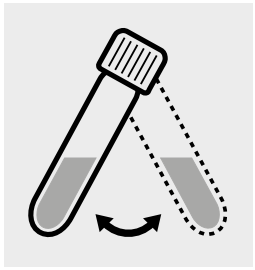
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



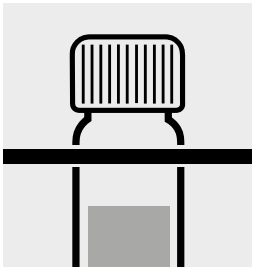
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



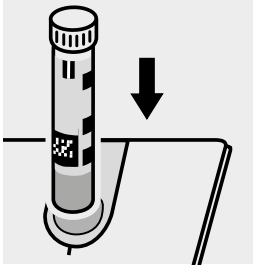
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents,measurement device, and handling) we recommended to use Spectroquant® CombiCheck 80, Cat.No. 1.14738, or the Standard solutions for photometric applications, Cat.Nos. 1.25031, 1.25032, and 1.25033.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 80) is highly recommended.

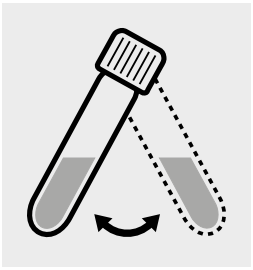
COD

Chemical Oxygen Demand

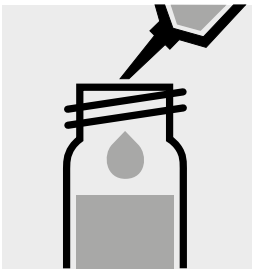
1.14555

Cell Test

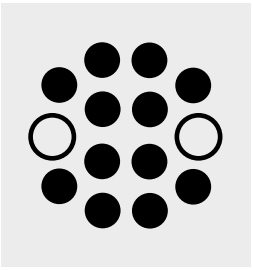
Measuring range:	500 – 10000 mg/l COD or O_2 Expression of results also possible in mmol/l.



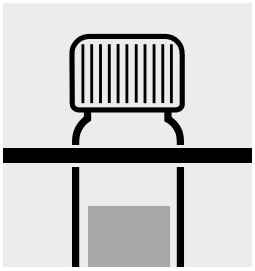
Suspend the bottom sediment in the cell by swirling.



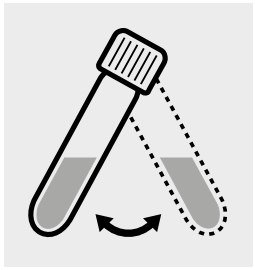
Carefully pipette 1.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



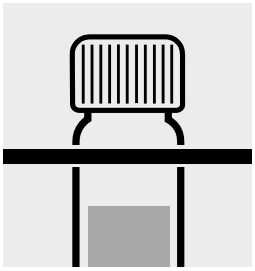
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



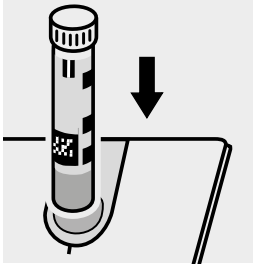
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 70, Cat.No. 1.14689, or the Standard solutions for photometric applications, Cat.Nos. 1.25032, 1.25033, and 1.25034.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 70) is highly recommended.

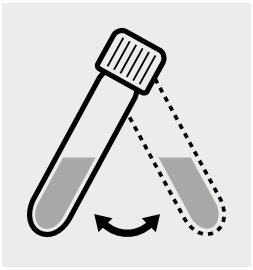
COD

Chemical Oxygen Demand

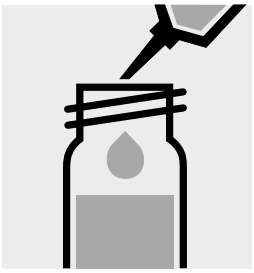
1.01797

Cell Test

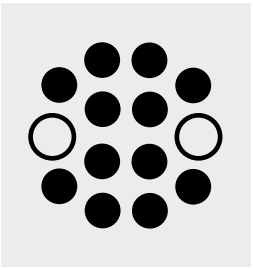
Measuring range:	5000 – 90000 mg/l COD or O_2 Expression of results also possible in mmol/l.



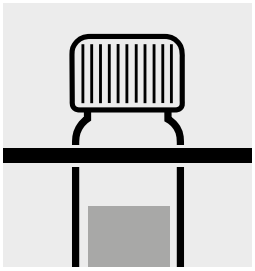
Suspend the bottom sediment in the cell by swirling.



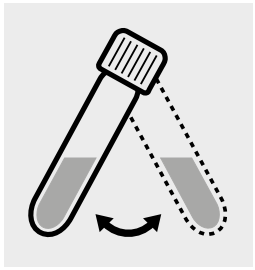
Carefully pipette 0.10 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



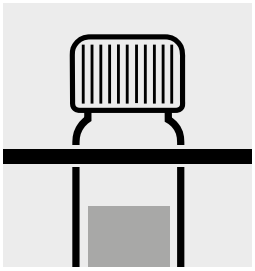
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



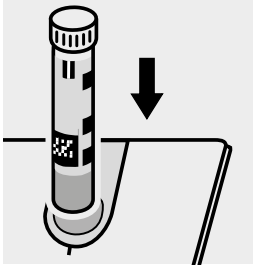
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use the Standard solutions for photometric applications, Cat.Nos. 1.25034 and 1.25035.

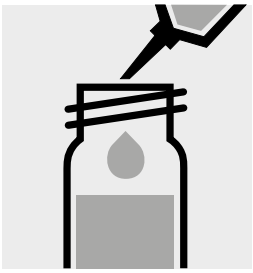
COD (Hg-free)

Chemical Oxygen Demand

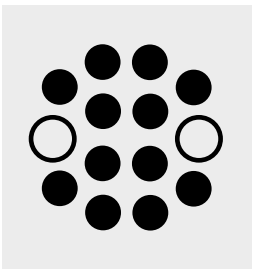
1.09772

Cell Test

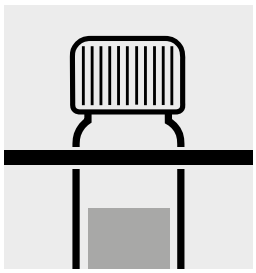
Measuring range:	10 – 150 mg/l COD or O_2 Expression of results also possible in mmol/l.



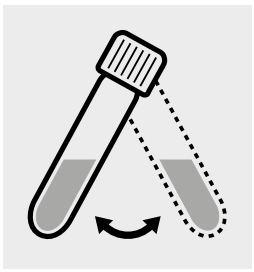
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



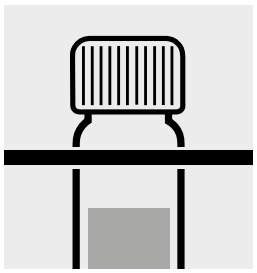
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



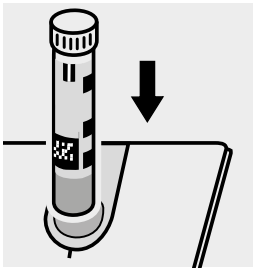
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use the Standard solutions for photometric applications, Cat.Nos. 1.25028 and 1.25029.

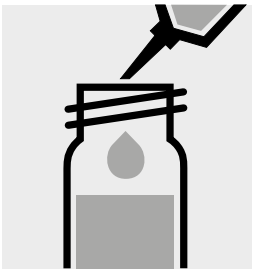
COD (Hg-free)

Chemical Oxygen Demand

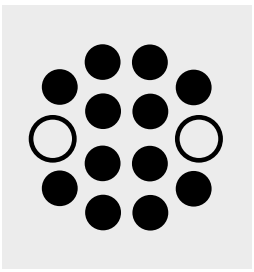
1.09773

Cell Test

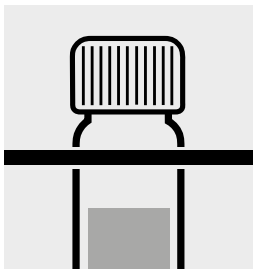
Measuring range:	100 – 1500 mg/l COD or O_2 Expression of results also possible in mmol/l.



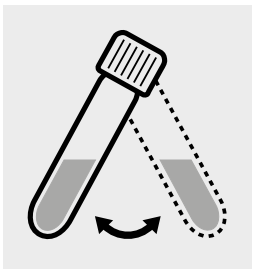
Carefully pipette 2.0 ml of the sample into a reaction cell, close tightly with the screw cap, and mix vigorously. **Caution, the cell becomes hot!**



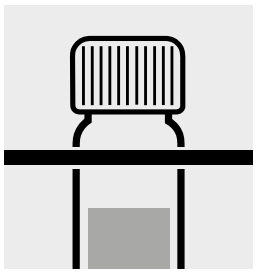
Heat the reaction cell in the thermoreactor at 148 °C for 2 hours.



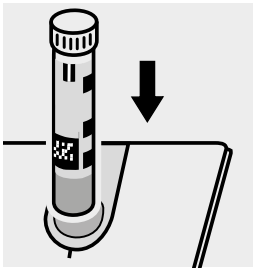
Remove the cell from the thermoreactor and place in a test-tube rack to cool.



Swirl the cell after 10 minutes.



Replace the cell in the rack for complete cooling to room temperature. **Very important!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

To increase the accuracy is recommended to measure against an own prepared blank sample (reaction cell + COD-free water).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use the Standard solutions for photometric applications, Cat.Nos. 1.25029, 1.25030, 1.25031, and 1.25032.

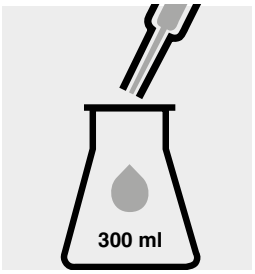
COD
Chemical Oxygen Demand for seawater / high chloride contents

1.17058

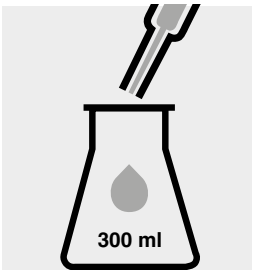
Cell Test

Measuring range:	5.0 – 60.0 mg/l COD or O_2 Expression of results also possible in mmol/l.

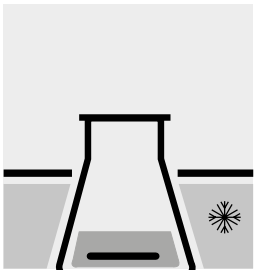
Chloride depletion:



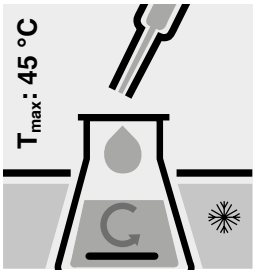
Pipette with glass pipette 20 ml of the sample into a 300-ml Erlenmeyer flask with NS 29/32.



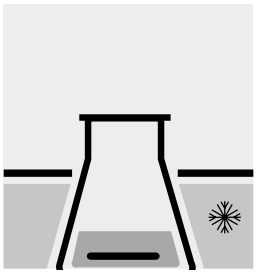
Pipette with glass pipette 20 ml of distilled water (Water for chromatography LiChrosolv®, Cat.No. 1.15333, is recommended) into a second 300-ml Erlenmeyer flask with NS 29/32.



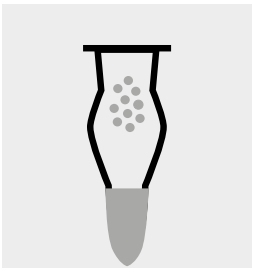
Add to each a magnetic stirring rod, and cool in the ice bath.



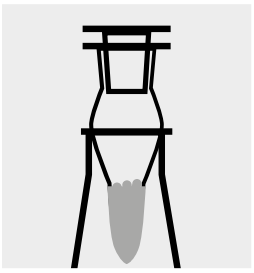
Add **slowly** to each Erlenmeyer flask 25 ml of **Sulfuric acid for the determination of COD** (Cat. No. 1.17048) with glass pipette **under cooling and stirring**.



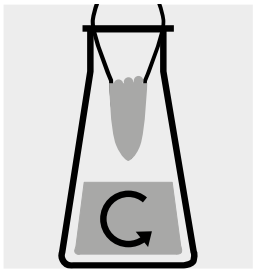
Cool both Erlenmeyer flasks to room temperature in the ice bath.



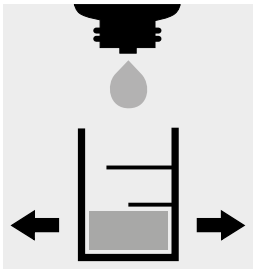
Fill 6 - 7 g each of **Sodalime with indicator** (Cat. No. 1.06733) into two absorption tubes (Cat. No. 1.15955).



Close the absorption tubes with the glass stoppers, and attach to the top of the Erlenmeyer flasks.



Stir at 250 rpm for 2 h at room temperature: depleted sample / depleted blank



Check the chloride content of the depleted sample using MQuant® Chloride Test (Cat. No. 1.11132) according to the application (see the website): Specified value <2000 mg/l Cl^-.

Chloride determination (acc. the application instructions - abridged version):

Fill 5.0 ml of sodium hydroxide solution 2 mol/l, Cat. No. 1.09136, into the test vessel of the MQuant® Chloride Test, Cat. No. 1.11132.
Carefully allow to run from the pipette 0.5 ml of depleted sample down the inside of the tilted test vessel onto the sodium hydroxide solution and mix (**Wear eye protection! The cell becomes hot!**).
Add 2 drops of reagent Cl-1 and swirl. The sample directly turns yellow in color. (Reagent Cl-2 is not required.)
Holding the reagent bottle vertically, slowly add reagent Cl-3 dropwise to the sample while swirling until its color changes from yellow to blue-violet. Shortly before the color changes, wait a few seconds after adding each drop.

Result in mg/l chloride = number of drops x 250

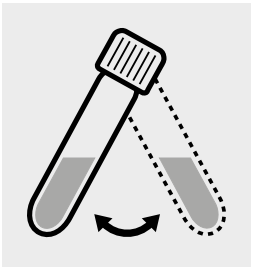
COD

Chemical Oxygen Demand for seawater / high chloride contents

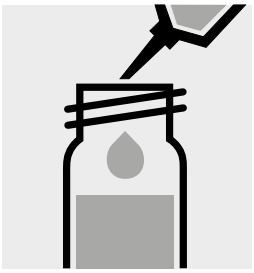
1.17058

Cell Test

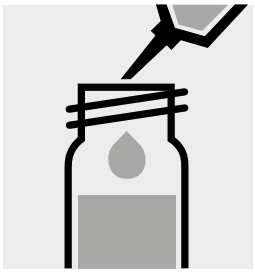
Determination:



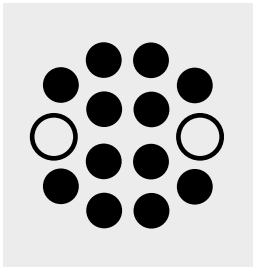
Suspend the bottom sediment in two cells by swirling.



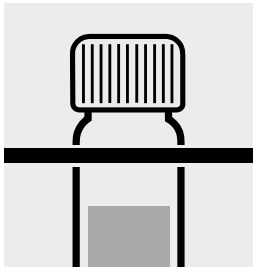
Carefully pipette 5.0 ml of the **depleted sample** into a reaction cell, close tightly with the screw cap, and mix vigorously.
Caution, the cell becomes hot!



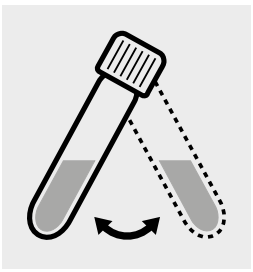
Carefully pipette 5.0 ml of the **depleted blank** into a second reaction cell, close tightly with the screw cap, and mix vigorously.
Caution, the cell becomes hot!
(Blank cell)



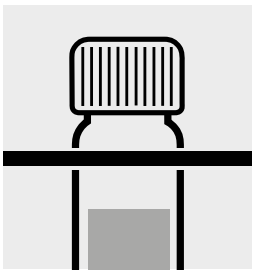
Heat both cells in the thermoreactor at 148 °C for 2 hours.



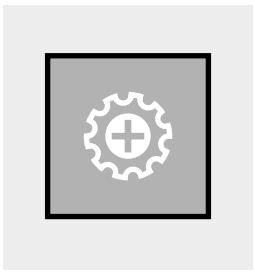
Remove both cells from the thermoreactor and place in a test-tube rack to cool.



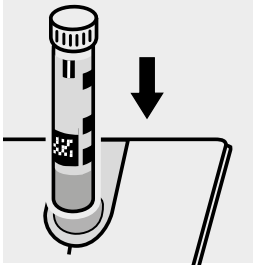
Swirl both cells after 10 minutes.



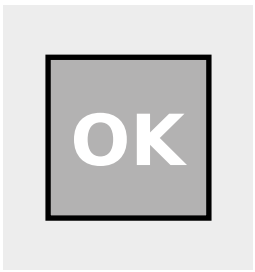
Replace both cells in the rack for complete cooling to room temperature. (**Very important!**)



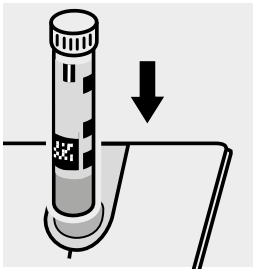
Tap the <Settings> button.
Select "Reagent blank".



Place the blank cell into the cell compartment. Align the mark on the cell with that on the photometer.



Select "User RB". Confirm with <OK>.



Place the cell containing the sample into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a COD/chloride standard solution must be prepared from Potassium hydrogen phthalate, Cat.No. 1.02400 and Sodium chloride, Cat.No. 1.06406 (see section "Standard solutions").

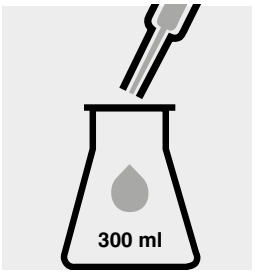
COD
Chemical Oxygen Demand for seawater / high chloride contents

1.17059

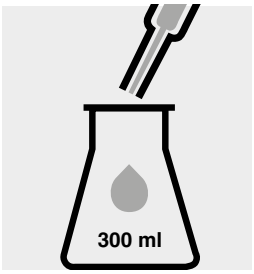
Cell Test

Measuring range:	50 – 3000 mg/l COD or O_2 Expression of results also possible in mmol/l.

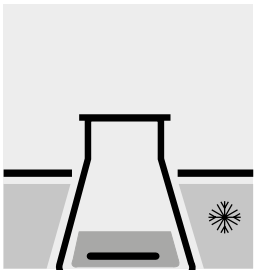
Chloride depletion:



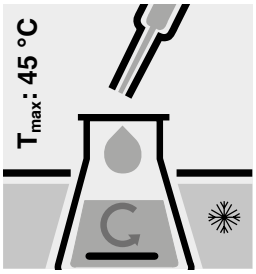
Pipette with glass pipette 20 ml of the sample into a 300-ml Erlenmeyer flask with NS 29/32.



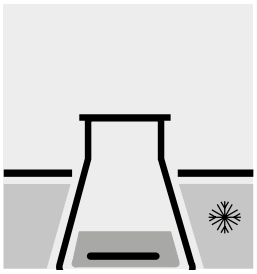
Pipette with glass pipette 20 ml of distilled water (Water for chromatography LiChrosolv®, Cat.No. 1.15333, is recommended) into a second 300-ml Erlenmeyer flask with NS 29/32.



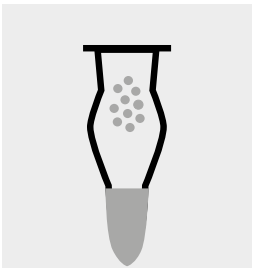
Add to each a magnetic stirring rod, and cool in the ice bath.



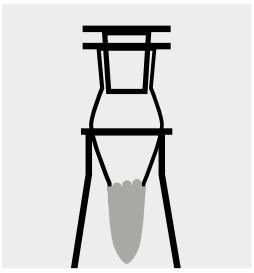
Add **slowly** to each Erlenmeyer flask 25 ml of **Sulfuric acid for the determination of COD** (Cat. No. 1.17048) with glass pipette **under cooling and stirring**.



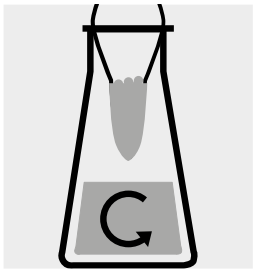
Cool both Erlenmeyer flasks to room temperature in the ice bath.



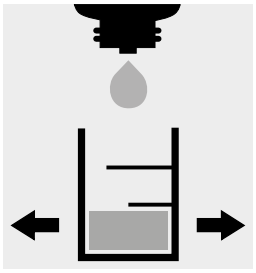
Fill 6 - 7 g each of **Sodalime with indicator** (Cat. No. 1.06733) into two absorption tubes (Cat. No. 1.15955).



Close the absorption tubes with the glass stoppers, and attach to the top of the Erlenmeyer flasks.



Stir at 250 rpm for 2 h at room temperature: depleted sample / depleted blank



Check the chloride content of the depleted sample using MQuant® Chloride Test (Cat. No. 1.11132) according to the application (see the website): specified value <250 mg/l Cl^-.

Chloride determination (acc. the application instructions - abridged version):

Fill 5.0 ml of sodium hydroxide solution 2 mol/l, Cat. No. 1.09136, into the test vessel of the MQuant® Chloride Test, Cat. No. 1.11132.
Carefully allow to run from the pipette 0.5 ml of depleted sample down the inside of the tilted test vessel onto the sodium hydroxide solution and mix (**Wear eye protection! The cell becomes hot!**).
Add 2 drops of reagent Cl-1 and swirl. The sample directly turns yellow in color. (Reagent Cl-2 is not required.)
Holding the reagent bottle vertically, slowly add reagent Cl-3 dropwise to the sample while swirling until its color changes from yellow to blue-violet. Shortly before the color changes, wait a few seconds after adding each drop.

Result in mg/l chloride = number of drops x 250

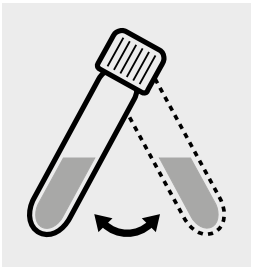
COD

Chemical Oxygen Demand
for seawater / high chloride contents

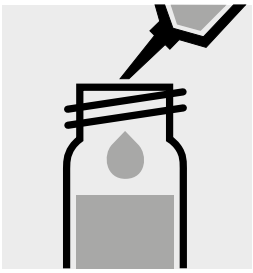
1.17059

Cell Test

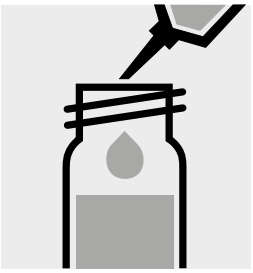
Determination:



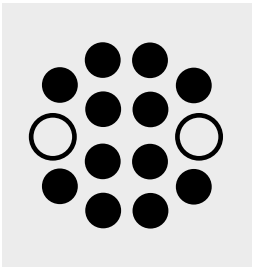
Suspend the bottom sediment in two cells by swirling.



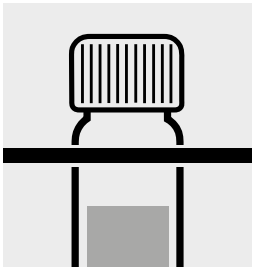
Carefully pipette 3.0 ml of the **depleted sample** into a reaction cell, close tightly with the screw cap, and mix vigorously.
Caution, the cell becomes hot!



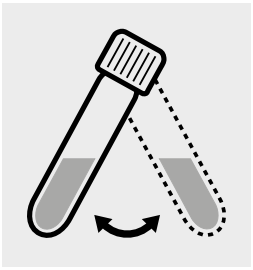
Carefully pipette 3.0 ml of the **depleted blank** into a second reaction cell, close tightly with the screw cap, and mix vigorously.
Caution, the cell becomes hot!
(Blank cell)



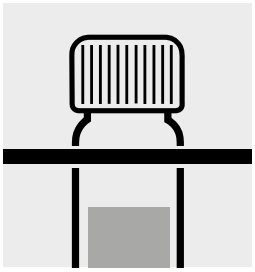
Heat both cells in the thermoreactor at 148 °C for 2 hours.



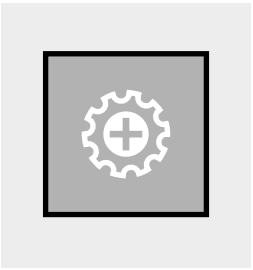
Remove both cells from the thermoreactor and place in a test-tube rack to cool.



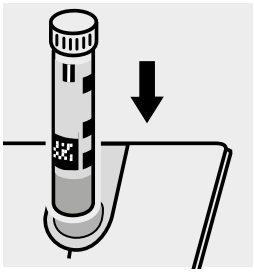
Swirl both cells after 10 minutes.



Replace both cells in the rack for complete cooling to room temperature. (**Very important!**)

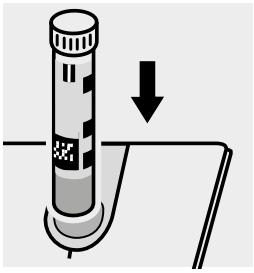


Tap the <Settings> button.
Select "Reagent blank".



Place the blank cell into the cell compartment. Align the mark on the cell with that on the photometer.

Select "User RB". Confirm with <OK>.



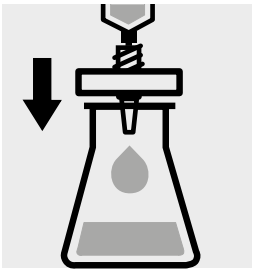
Place the cell containing the sample into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

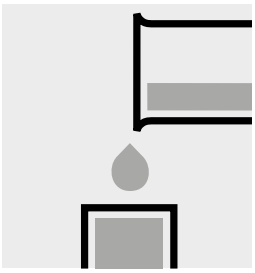
To check the measurement system (test reagents, measurement device, and handling) a COD/chloride standard solution must be prepared from Potassium hydrogen phthalate, Cat.No. 1.02400 and Sodium chloride, Cat.No. 1.06406 (see section "Standard solutions").

Color
(Spectral Absorption Coefficient)
analogous to **EN ISO 7887**

Measuring	1 – 250 m^{-1}	436 nm	10-mm cell	Method No. 015 α(436)
range:	0.3 – 125.0 m^{-1}	436 nm	20-mm cell	Method No. 015 α(436)
	0.1 – 50.0 m^{-1}	436 nm	50-mm cell	Method No. 015 α(436)
	1 – 250 m^{-1}	525 nm	10-mm cell	Method No. 061 α(525)
	0.3 – 125.0 m^{-1}	525 nm	20-mm cell	Method No. 061 α(525)
	0.1 – 50.0 m^{-1}	525 nm	50-mm cell	Method No. 061 α(525)
	1 – 250 m^{-1}	620 nm	10-mm cell	Method No. 078 α(620)
	0.3 – 125.0 m^{-1}	620 nm	20-mm cell	Method No. 078 α(620)
	0.1 – 50.0 m^{-1}	620 nm	50-mm cell	Method No. 078 α(620)

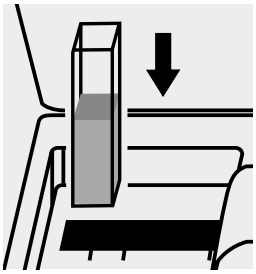


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into a corresponding cell.

Select method no. **15**, **61**, or **78**.

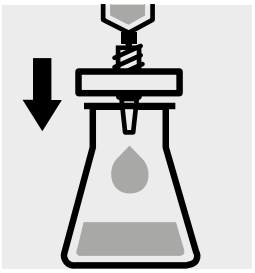


Place the cell into the cell compartment.
The measurement is performed automatically.

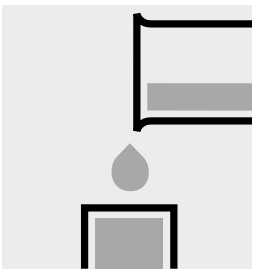
Notes:
Filtered sample = true color.
Unfiltered sample = apparent color.

Color
(True Color - 410 nm)
analogous to **EN ISO 7887**

Measuring	10 – 2500	mg/l Pt	10 – 2500	mg/l Pt/Co	10 – 2500	CU	10-mm cell	Method No. 303
range:	5 – 1250	mg/l Pt	5 – 1250	mg/l Pt/Co	5 – 1250	CU	20-mm cell	Method No. 303
	2 – 500	mg/l Pt	2 – 500	mg/l Pt/Co	2 – 500	CU	50-mm cell	Method No. 303

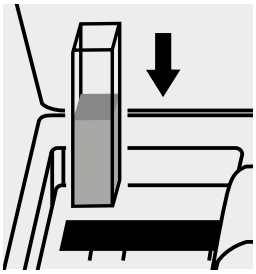


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into a corresponding cell.

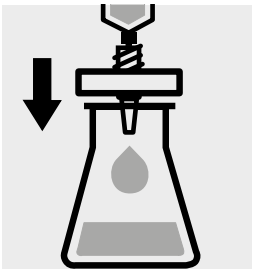
Select method no. **303**.



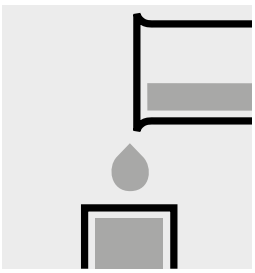
Place the cell into the cell compartment.
The measurement is performed automatically.

Color Hazen
(Platinum-Cobalt Standard Method)

Measuring	1	– 500	mg/l Pt/Co	1	– 500	mg/l Pt	1	– 500	Hazen	1	– 500	CU	340 nm	10-mm cell
range:	1	– 250	mg/l Pt/Co	1	– 250	mg/l Pt	1	– 250	Hazen	1	– 250	CU	340 nm	20-mm cell
	0.2	– 100.0	mg/l Pt/Co	0.2	– 100.0	mg/l Pt	0.2	– 100.0	Hazen	0.2	– 100.0	CU	340 nm	50-mm cell

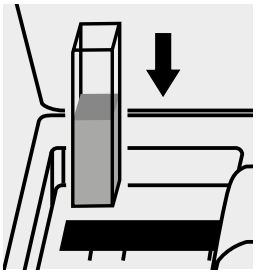


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into a corresponding cell.

Select method no. **32**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Notes:
Filtered sample = true color.
Unfiltered sample = apparent color.

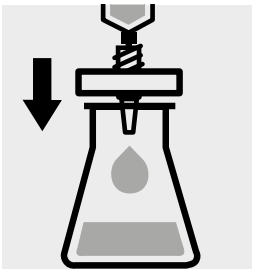
Quality assurance:

To check the measurement system (measurement device, handling) ready-to-use Platinum Cobalt Color Reference Solution (Hazen 500) Certipur®, Cat.No. 1.00246, concentration 500 mg/l Pt, can be used after diluting accordingly.

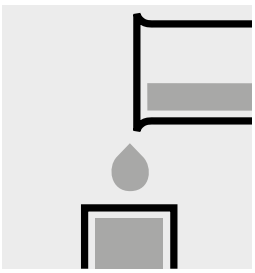
Color Hazen
(Platinum-Cobalt Standard Method)

analogous to **APHA 2120C, EN ISO 6271-2, Water Research Vol. 30, No. 11, 2771-2775, 1996**

Measuring	1–1000 mg/l Pt/Co	1–1000 mg/l Pt	1–1000 Hazen	1–1000 CU	445 nm	50-mm cell	Method No. 179*
range:	1–1000 mg/l Pt/Co	1–1000 mg/l Pt	1–1000 Hazen	1–1000 CU	455 nm	50-mm cell	Method No. 180
	1–1000 mg/l Pt/Co	1–1000 mg/l Pt	1–1000 Hazen	1–1000 CU	465 nm	50-mm cell	Method No. 181
	* not analogous to APHA 2120C						

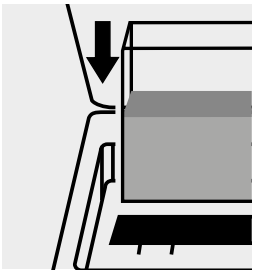


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into the cell.

Select method no. **179**, **180**, or **181**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Notes:
Filtered sample = true color.
Unfiltered sample = apparent color.

Quality assurance:

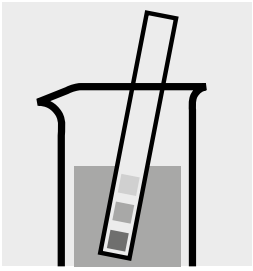
To check the measurement system (measurement device, handling) ready-to-use Platinum Cobalt Color Reference Solution (Hazen 500) Certipur®, Cat.No. 1.00246, concentration 500 mg/l Pt, can be used.

Copper

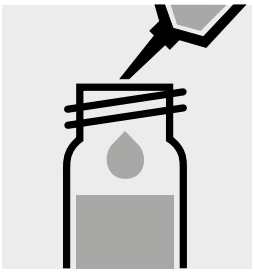
1.14553

Cell Test

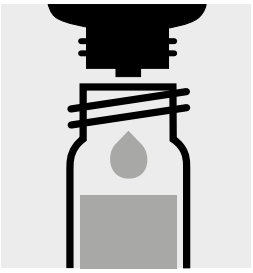
Measuring range:	0.05 – 8.00 mg/l Cu Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

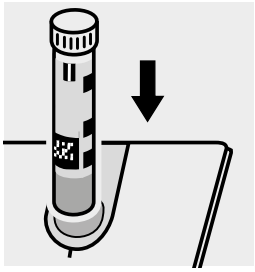


Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **Cu-1K**, close the cell with the screw cap, and mix.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high copper concentrations in the sample produce turquoise-colored solutions (measurement solution should be blue) and false-low readings are yielded.
In such cases the sample must be diluted (plausibility check).

For the determination of **total copper** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of copper (Σ Cu).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700.

Ready-to-use copper standard solution Certipur®, Cat.No. 1.19786, concentration 1000 mg/l Cu, can also be used after diluting accordingly.

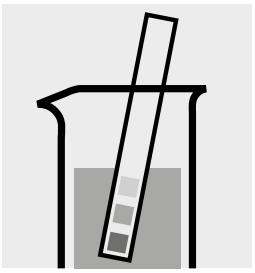
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Copper

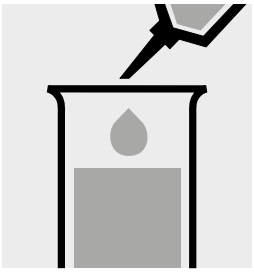
1.14767

Test

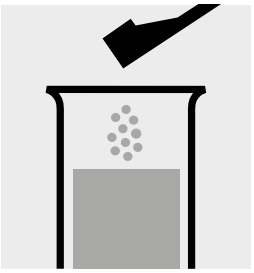
Measuring	0.10 – 6.00 mg/l Cu	10-mm cell
range:	0.05 – 3.00 mg/l Cu	20-mm cell
	0.02 – 1.20 mg/l Cu	50-mm cell
	Expression of results also possible in mmol/l.	



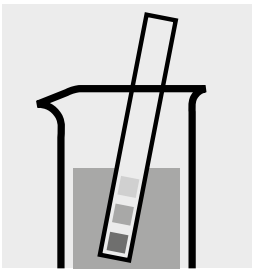
Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



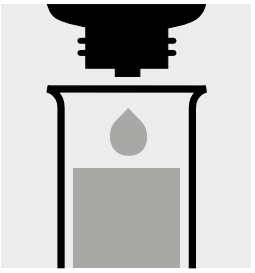
Pipette 5.0 ml of the sample into a test tube.



Add 1 green dosing spoon of **Cu-1** and dissolve the solid substance.

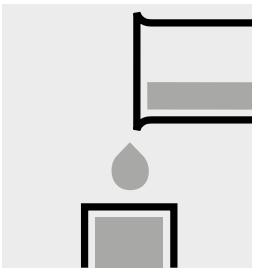


Check the pH, specified range: pH 7.0 – 9.5.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

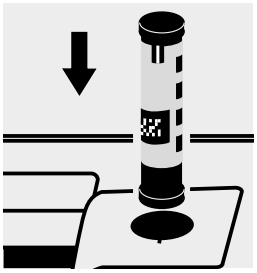


Add 5 drops of **Cu-2** and mix.

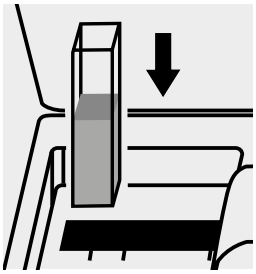
Reaction time:
5 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high copper concentrations in the sample produce turquoise-colored solutions (measurement solution should be blue) and false-low readings are yielded.
In such cases the sample must be diluted (plausibility check).

For the determination of **total copper** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of copper (Σ Cu).

To measure in the 50-mm cell, only the sample volume has to be doubled.
Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700.

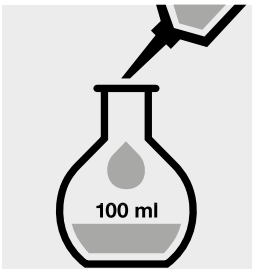
Ready-to-use copper standard solution Certipur®, Cat.No. 1.19786, concentration 1000 mg/l Cu, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

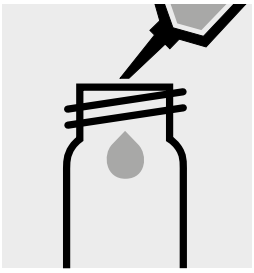
Copper in electroplating baths

Inherent color

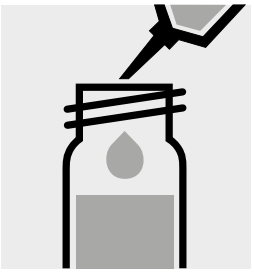
Measuring	10.0 – 80.0 g/l Cu	10-mm cell	Method No. 83
range:	5.0 – 40.0 g/l Cu	20-mm cell	Method No. 83
	2.0 – 16.0 g/l Cu	50-mm cell	Method No. 83



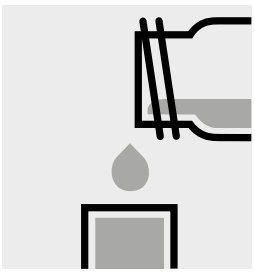
Pipette 25 ml of the sample into a 100-ml volumetric flask, fill to the mark with distilled water and mix thoroughly.



Pipette 5.0 ml of the 1:4 dilute sample into an empty round cell (Empty cells, Cat.No. 1.14724).

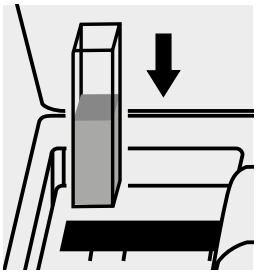


Add 5.0 ml of **sulfuric acid 40 %**, close the cell with the screw cap, and mix.



Transfer the solution into a corresponding cell.

Select method no. **83**.



Place the cell into the cell compartment. The measurement is performed automatically.

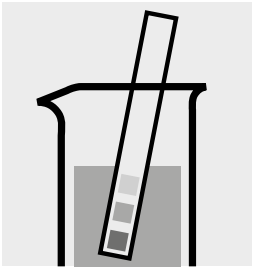
Cyanide

Determination of free cyanide

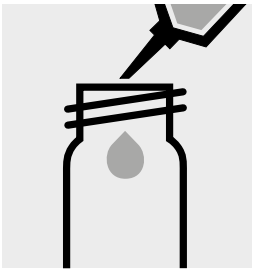
1.02531

Cell Test

Measuring range:	0.010 – 0.500 mg/l CN Expression of results also possible in mmol/l and cyanide free [CN(f)].

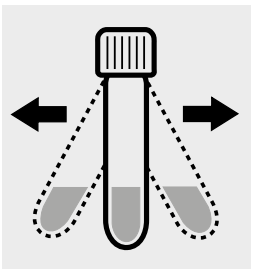


Check the pH of the sample, specified range: pH 4.5 – 8.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



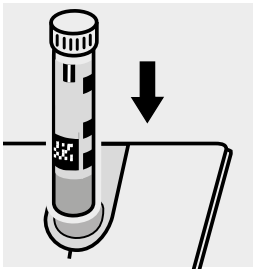
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and dissolve the solid substance.

Add 1 level blue micro-spoon of **CN-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use cyanide standard solution Certipur®, Cat.No. 1.19533, concentration 1000 mg/l CN^-, can be used after diluting accordingly.

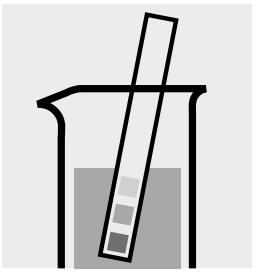
Cyanide

Determination of free cyanide

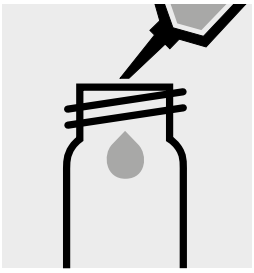
1.14561

Cell Test

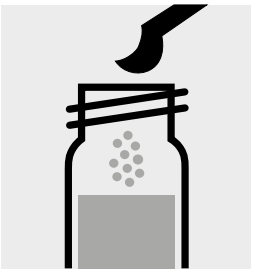
Measuring range:	0.010 – 0.500 mg/l CN Expression of results also possible in mmol/l and cyanide free [CN(f)].



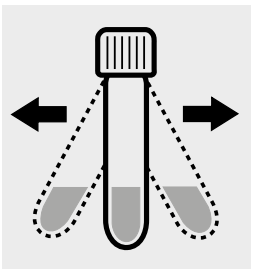
Check the pH of the sample, specified range: pH 4.5 – 8.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and dissolve the solid substance.

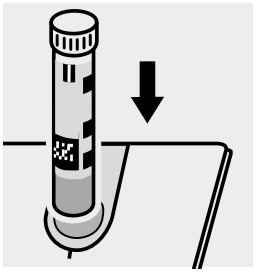


Add 1 level blue micro-spoon of **CN-3K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use cyanide standard solution Certipur®, Cat.No. 1.19533, concentration 1000 mg/l CN^-, can be used after diluting accordingly.

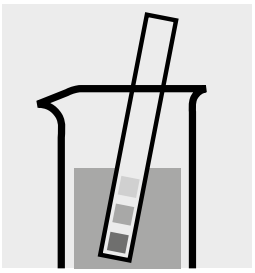
Cyanide

Determination of readily liberated cyanide

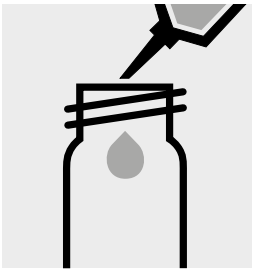
1.14561

Cell Test

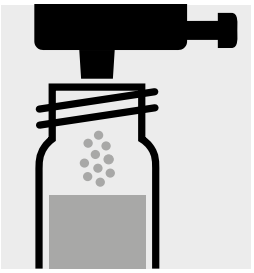
Measuring range:	0.010 – 0.500 mg/l CN Expression of results also possible in mmol/l and cyanide readily liberated [CN(v)].



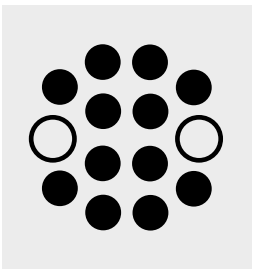
Check the pH of the sample, specified range: pH 4.5 – 8.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



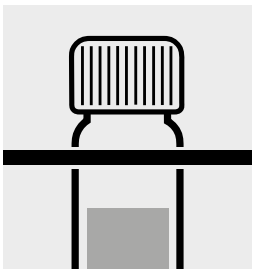
Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).



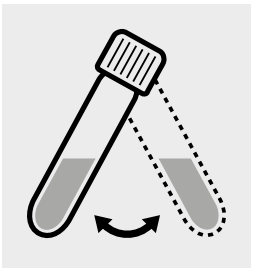
Add 1 dose of **CN-1K** using the green dose-metering cap, close the cell with the screw cap.



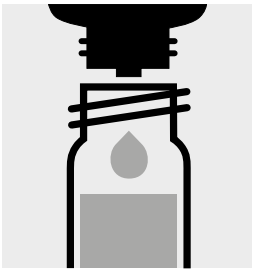
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



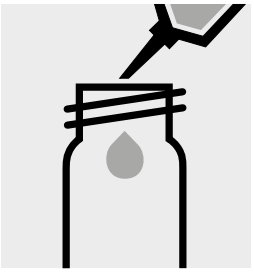
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



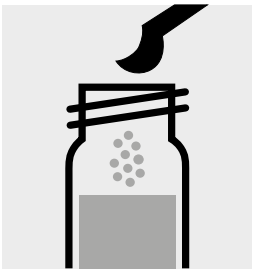
Swirl the cell before opening.



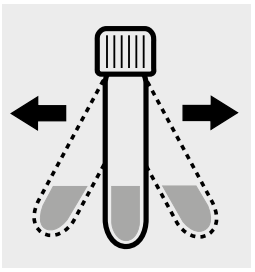
Add 3 drops of **CN-2K**, close with the screw cap, and mix: **pretreated sample**.



Pipette 5.0 ml of the **pretreated sample** into a reaction cell, close with the screw cap, and dissolve the solid substance.

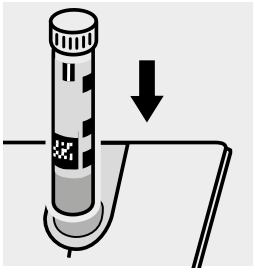


Add 1 level blue microspoon of **CN-3K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use cyanide standard solution Certipur®, Cat.No. 1.19533, concentration 1000 mg/l CN^-, can be used after diluting accordingly.

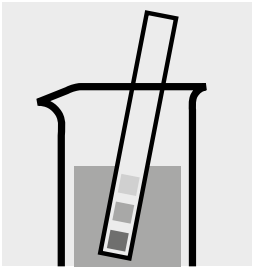
Cyanide

Determination of free cyanide

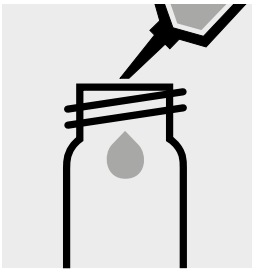
1.09701

Test

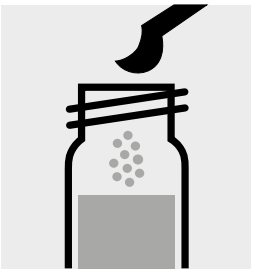
Measuring	0.010 – 0.500 mg/l CN	10-mm cell
range:	0.005 – 0.250 mg/l CN	20-mm cell
	0.0020 – 0.1000 mg/l CN	50-mm cell
	Expression of results also possible in mmol/l and cyanide free [CN(f)].	



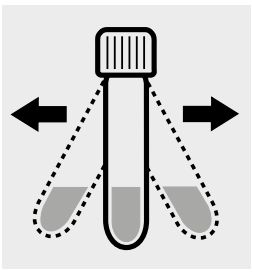
Check the pH of the sample, specified range: pH 4.5 – 8.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

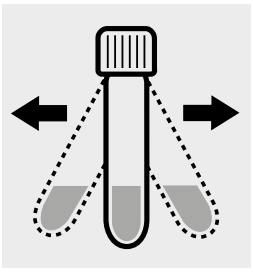


Add 1 level green micro-spoon of **CN-3,** close the cell with the screw cap.



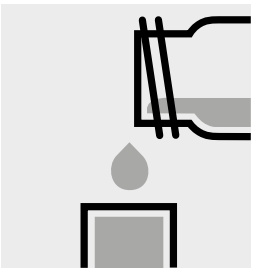
Shake the cell vigorously to dissolve the solid substance.

Add 1 level blue micro-spoon of **CN-4,** close the cell with the screw cap.

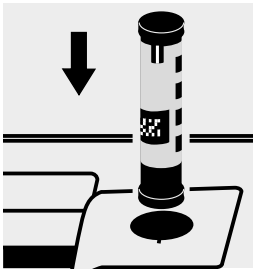


Shake the cell vigorously to dissolve the solid substance.

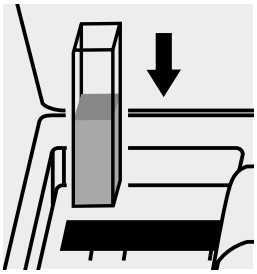
Reaction time:
10 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus preventing any gas losses.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents CN-3 and CN-4 have to be doubled for each.
Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use cyanide standard solution Certipur®, Cat.No. 1.19533, concentration 1000 mg/l CN^-, can be used after diluting accordingly.

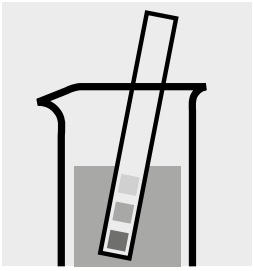
Cyanide

Determination of readily liberated cyanide

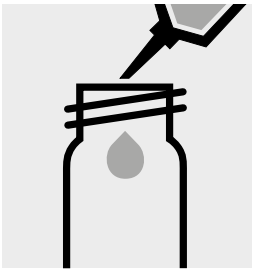
1.09701

Test

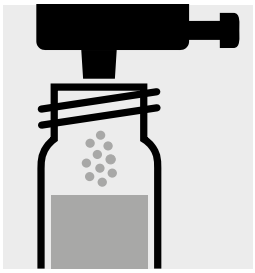
Measuring range:	0.010 – 0.500 mg/l CN	10-mm cell
	0.005 – 0.250 mg/l CN	20-mm cell
	0.0020 – 0.1000 mg/l CN	50-mm cell
	Expression of results also possible in mmol/l and cyanide readily liberated [CN(v)].	



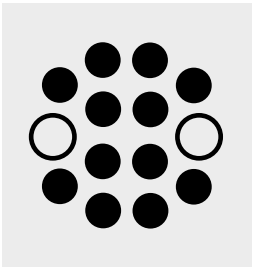
Check the pH of the sample, specified range: pH 4.5 – 8.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



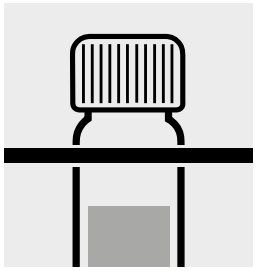
Add 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).



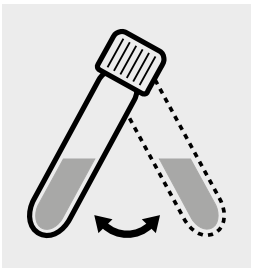
Add 1 dose of **CN-1** using the green dose-metering cap, close the cell with the screw cap.



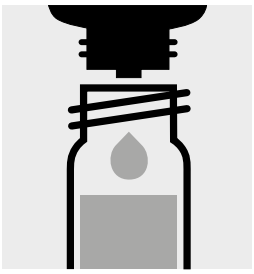
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



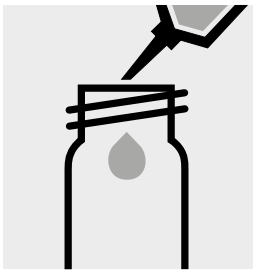
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



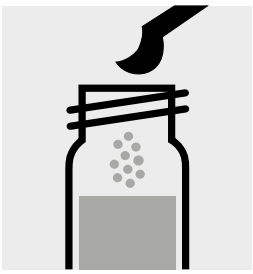
Swirl the cell before opening.



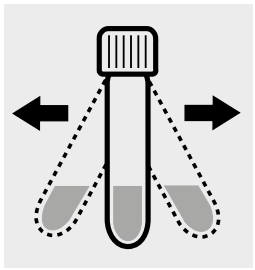
Add 3 drops of **CN-2**, close with the scew cap, and mix: **pretreated sample**.



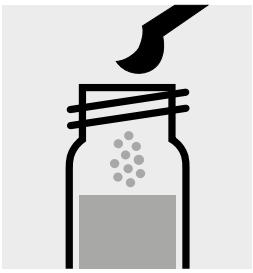
Pipette 5.0 ml of the **pretreated sample** into an empty round cell (Empty cells, Cat.No. 1.14724).



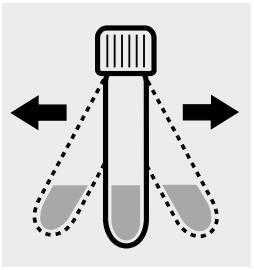
Add 1 level green micro-spoon of **CN-3**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

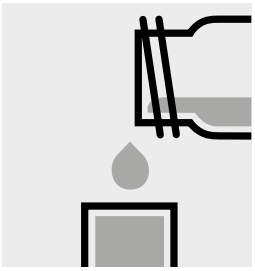


Add 1 level blue micro-spoon of **CN-4**, close the cell with the screw cap.

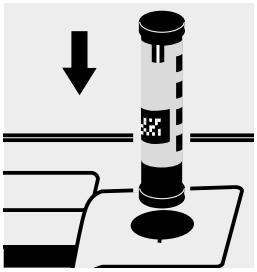


Shake the cell vigorously to dissolve the solid substance.

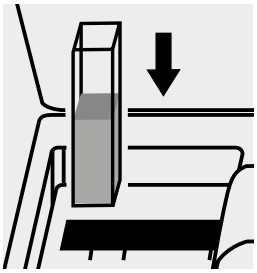
Reaction time: 10 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus preventing any gas losses.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents CN-3 and CN-4 have to be doubled for each.
Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

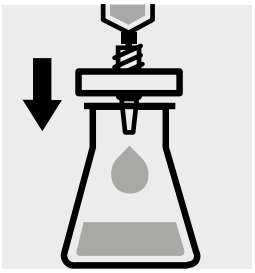
To check the measurement system (test reagents, measurement device, and handling) ready-to-use cyanide standard solution Certipur®, Cat.No. 1.19533, concentration 1000 mg/l CN^-, can be used after diluting accordingly.

Cyanuric Acid

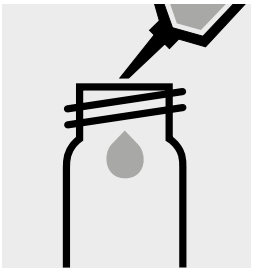
1.19253

Test

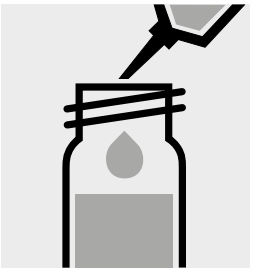
Measuring range:	2 – 160 mg/l cyanuric acid Expression of results also possible in mmol/l.	20-mm cell



Filter turbid samples.

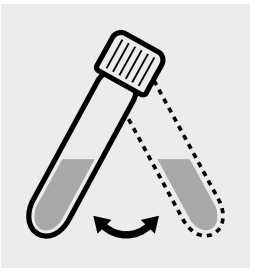


Pipette 5.0 ml of the sample into an empty test tube (e.g. flat-bottomed tubes, Cat.No. 1.14902).

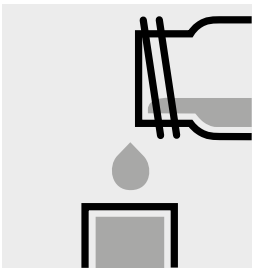


Add **5.0 ml of distilled water** (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) with pipette, close with the screw cap, and mix.

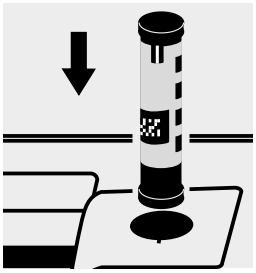
Add 1 **reagent tablet Cyanuric Acid**, crush with stirring rod, and close with the screw cap.



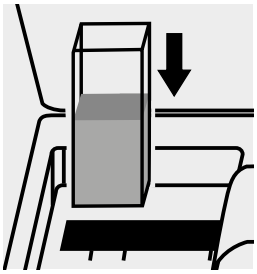
Swirl the cell to dissolve the solid substance.



Transfer the solution into a rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a cyanuric acid standard solution must be prepared from Cyanuric acid, Cat.No. 8.20358 (see section "Standard solutions").

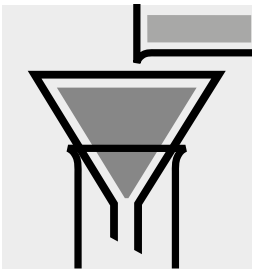
$\Delta K_{268\ nm}$ of olive oil

corresponds to **Commission Regulation (EEC) No 2568/91 Annex IX**

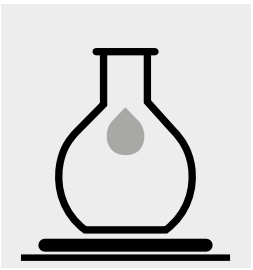
Application

Measuring range:	-0.10 – 1.00 ΔK_{268}	10-mm quartz cell	Method No. 2528
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.		

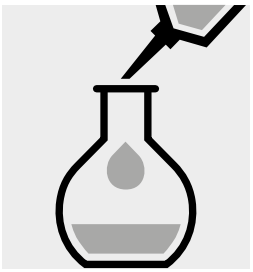
(Melt, if necessary) the sample and homogenize.



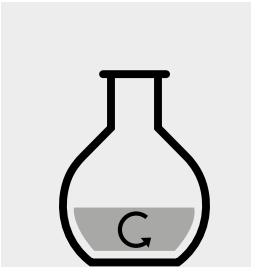
If contaminations are present, filter the sample over a fast filtering paper.



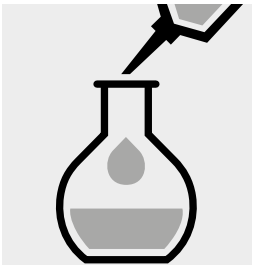
Weigh the sample into a volumetric flask, accurately weighed to 1 mg.



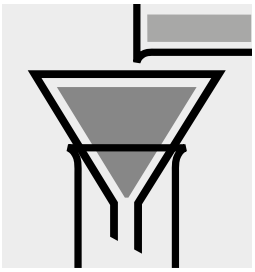
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718).



Dissolve the sample at room temperature.



Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) and mix.

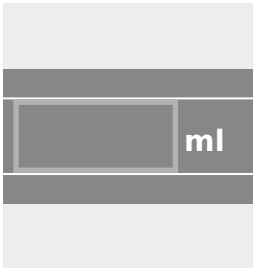


Filter turbid solutions over a paper filter.

Select method no. **2528**. Perform the zero adjustment and confirm by pressing the <OK> button.

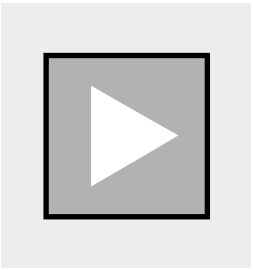
Enter the sample weight in grams.

Confirm with <OK>.

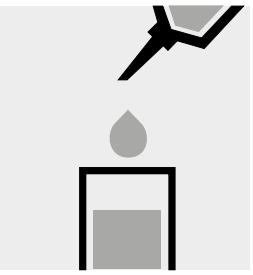


Enter the volume of the sample solution in milliliters.

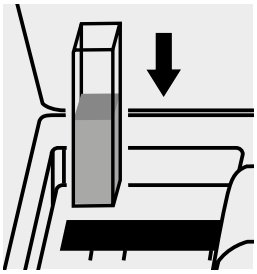
Confirm with <OK>.



Tap the <Start> button.

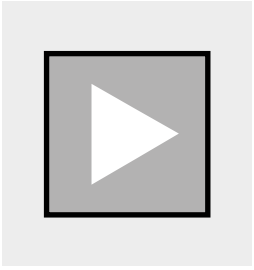


Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The ΔK_{268} value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

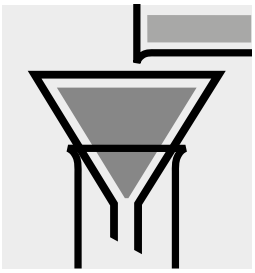
ΔK_{270} nm of olive oil

corresponds to **Commission Regulation (EEC) No 2568/91 Annex IX**

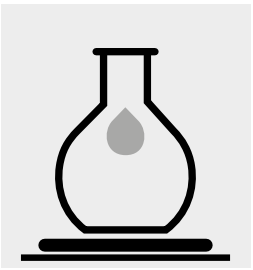
Application

Measuring range:	-0.10 – 1.00 ΔK_{270}	10-mm quartz cell	Method No. 2529
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from cyclohexane, is recommended. This zero value remains valid until the method is exited.		

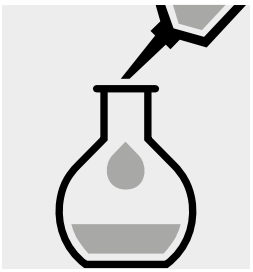
(Melt, if necessary) the sample and homogenize.



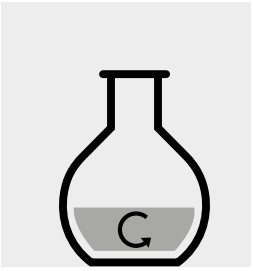
If contaminations are present, filter the sample over a fast filtering paper.



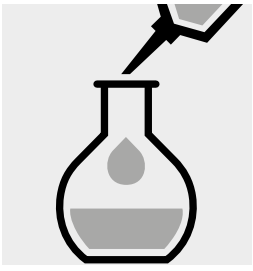
Weigh the sample into a volumetric flask, accurately weighed to 1 mg.



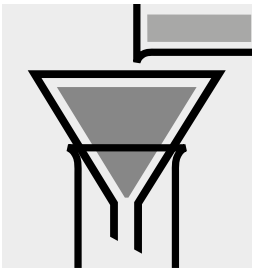
Add a few milliliters of **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822).



Dissolve the sample at room temperature.



Make up the contents of the volumetric flask to the mark with **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822) and mix.

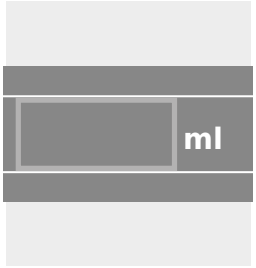


Filter turbid solutions over a paper filter.

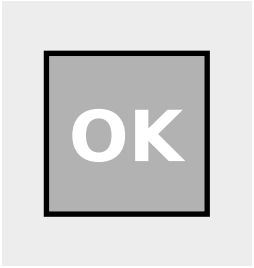
Select method no. **2529**. Perform the zero adjustment and confirm by pressing the <OK> button.

Enter the sample weight in grams.

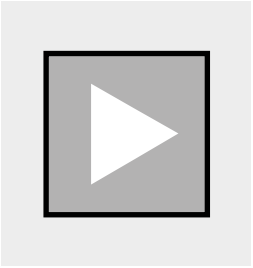
Confirm with <OK>.



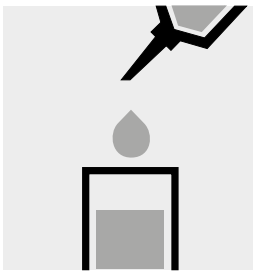
Enter the volume of the sample solution in milliliters.



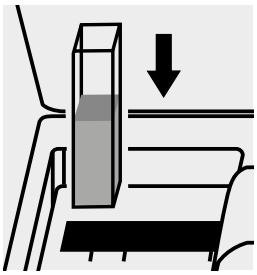
Confirm with <OK>.



Tap the <Start> button.

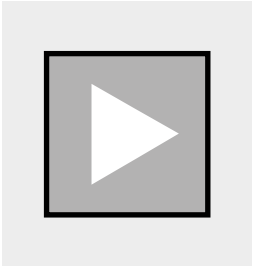


Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The ΔK_{270} value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

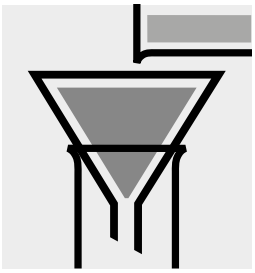
DOBI (Deterioration of the bleachability index) of raw palm oil

corresponds to **EN ISO 17932:2011**

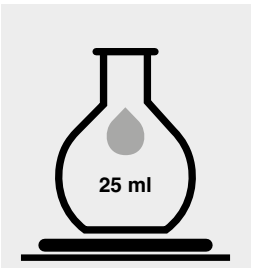
Application

Measuring range:	0 – 4.00 DOBI	10-mm quartz cell	Method No. 2524
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.		

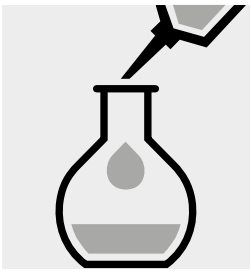
Melt the sample at 60 - 70 °C and homogenize.



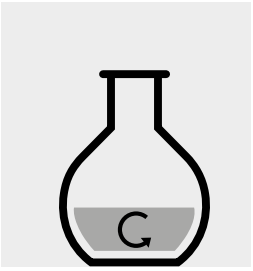
If contaminations are present, filter the sample over a fast filtering paper.



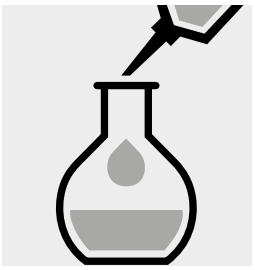
Weigh **between 100 mg to 500 mg of sample** into a 25-ml volumetric flask.



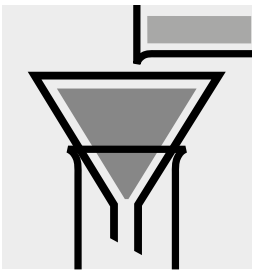
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718).



Dissolve the sample at room temperature.

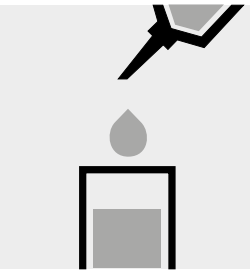


Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) and mix.

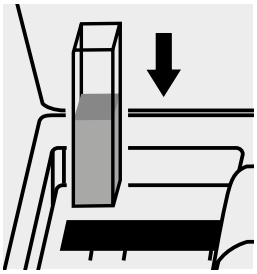


Filter turbid solutions over a paper filter.

Select method no. **2524**. Perform the zero adjustment and confirm by pressing the <OK> button.

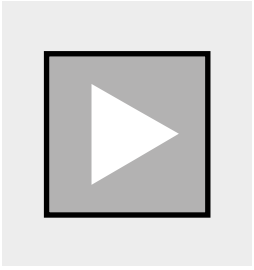


Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>. The DOBI value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

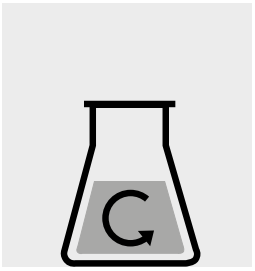
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

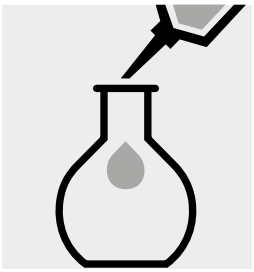
dsDNA
in purified solutions

Application

Measuring range:	5 – 37 500 µg/ml dsDNA	10-mm quartz cell	Method No. 2512
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from sample solvent, is recommended. This zero value remains valid until the method is exited.		

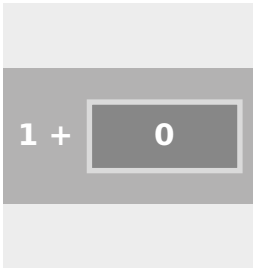


Homogenize the sample **carefully**.



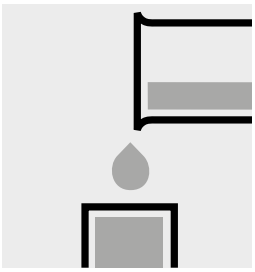
If necessary, dilute the sample.
Note the dilution ratio (1 + x): measurement sample.

Select method no. **2512**. Perform the zero adjustment with sample solvent and confirm by pressing the <OK> button.

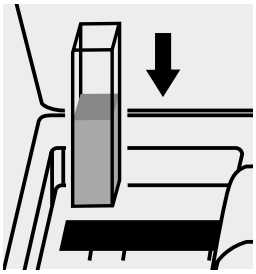


Enter the dilution ratio (1 part of sample + x parts of sample solvent).

Confirm with <OK>.

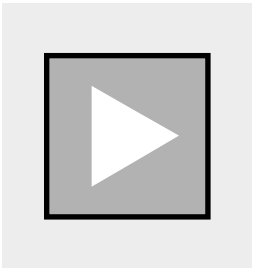


Transfer the **measurement sample** into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

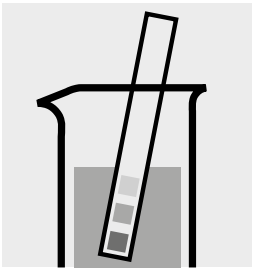
Fluoride

1.00809

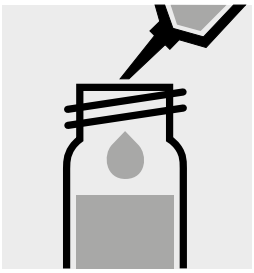
Cell Test

Measuring range:	0.10 – 1.80 mg/l F	Round cell
	0.025 – 0.500 mg/l F	50-mm cell
	Expression of results also possible in mmol/l.	

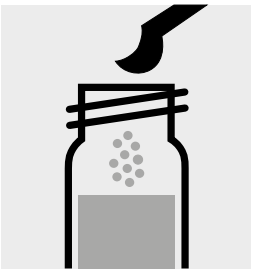
Measuring range: 0.10 – 1.80 mg/l F



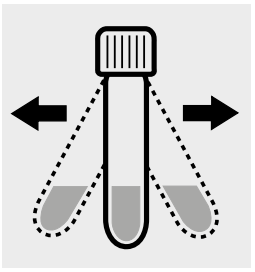
Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

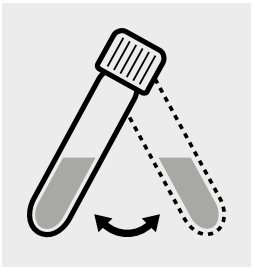


Add 1 level blue micro-spoon of **F-1K**, close the cell with the screw cap.

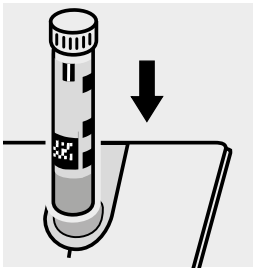


Shake the cell vigorously to dissolve the solid substance.

Reaction time: 15 minutes



Swirl the cell before measurement.



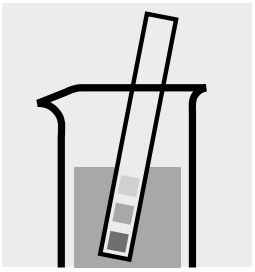
Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Fluoride

1.00809

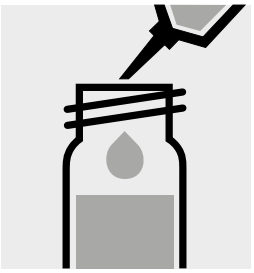
Cell Test

Measuring range: 0.025 – 0.500 mg/l F

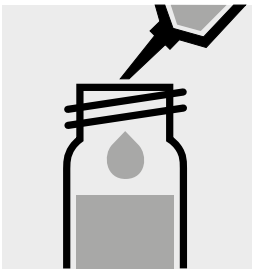


Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

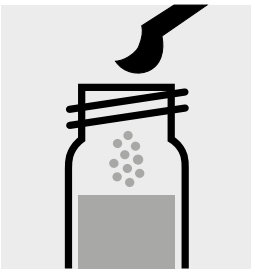
Select method no. **216**.



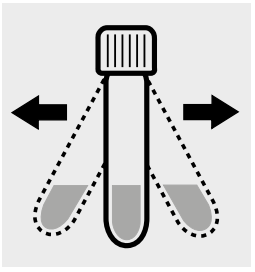
Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.



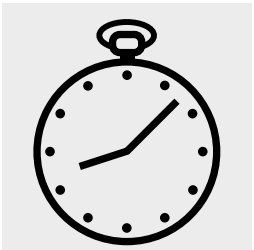
Pipette 10 ml of distilled water into a second reaction cell, close with the screw cap, and mix. (Blank)



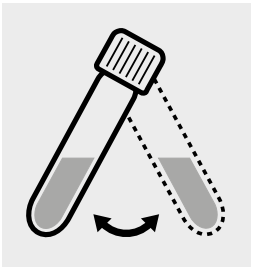
Add 1 level blue microspoon of **F-1K** to each cell, close with the screw cap.



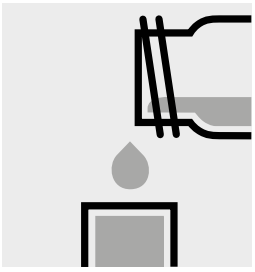
Shake both cells vigorously to dissolve the solid substance.



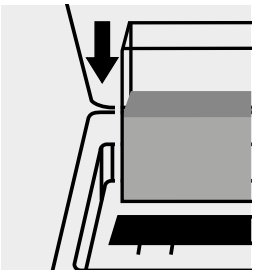
Reaction time:
15 minutes



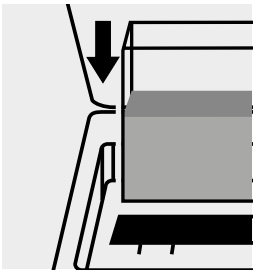
Swirl the cells.



Transfer both solutions into two separate 50-mm-cells.



Place the blank cell into the cell compartment.



Place the cell containing the sample into the cell compartment.

Important:

Very high fluoride concentrations in the sample produce brown-colored solutions (measurement solution should be violet) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

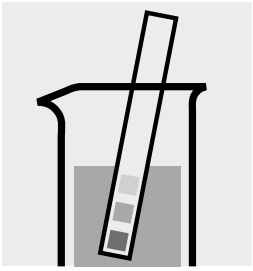
To check the measurement system (test reagents, measurement device, and handling) ready-to-use fluoride standard solution Certipur®, Cat.No. 1.19814, concentration 1000 mg/l F^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32233, 1.32234, 1.32235, and 1.32236.

Fluoride

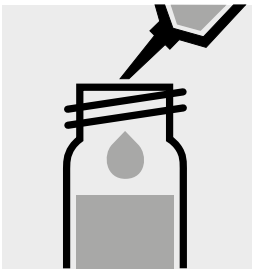
1.17243

Cell Test

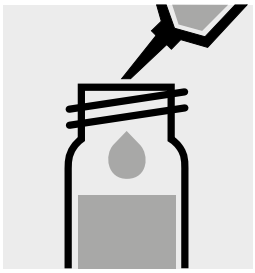
Measuring range:	0.10 – 2.50 mg/l F Expression of results also possible in mmol/l.



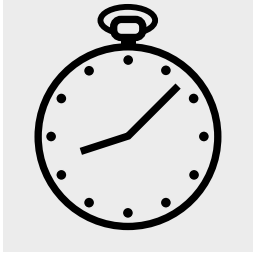
Check the pH of the sample, specified range: pH 2 – 12.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



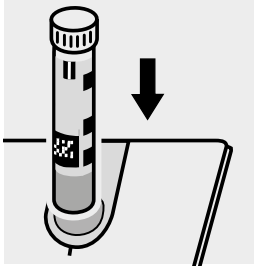
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



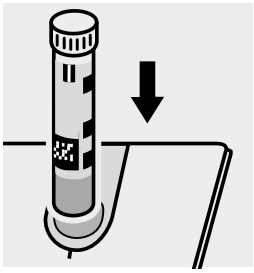
Pipette 5.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a second reaction cell, close with the screw cap, and mix. (Blank)



Reaction time: 1 minute



Place the blank cell into the cell compartment. Align the mark on the cell with that on the photometer.



Place the cell containing the sample into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use fluoride standard solution Certipur®, Cat.No. 1.19814, concentration 1000 mg/l F^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32233, 1.32234, 1.32235, and 1.32236.

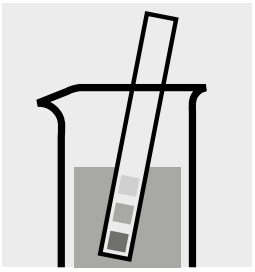
Fluoride

1.14598

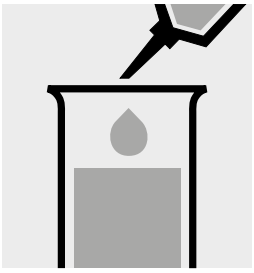
Test

Measuring range:	0.10 – 2.00 mg/l F	10-mm cell
	1.0 – 20.0 mg/l F	10-mm cell
	Expression of results also possible in mmol/l.	

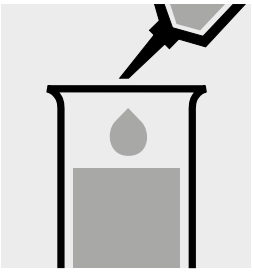
Measuring range: 0.10 – 2.00 mg/l F



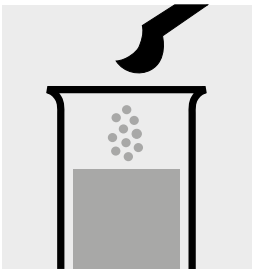
Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



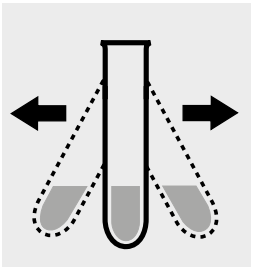
Pipette 2.0 ml of **F-1** into a test tube.



Add 5.0 ml of the sample with pipette and mix.

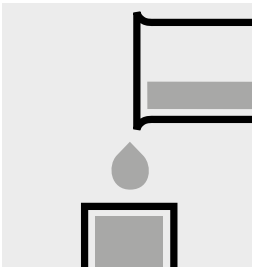


Add 1 level microspoon of **F-2** and mix.

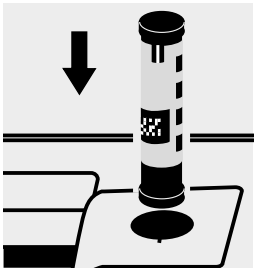


Shake the test tube vigorously to dissolve the solid substance.

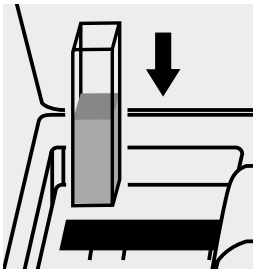
Reaction time:
5 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 0.10 – 2.00 mg/l F.



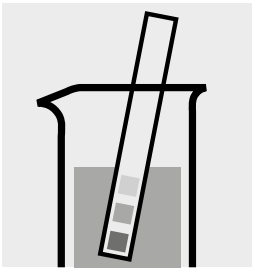
Place the cell into the cell compartment.

Fluoride

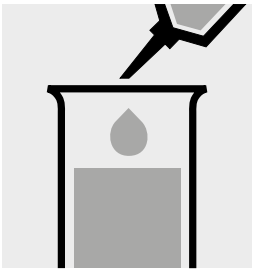
1.14598

Test

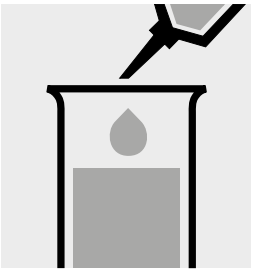
Measuring range: 1.0 – 20.0 mg/l F



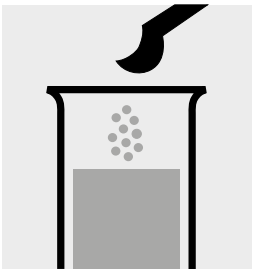
Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



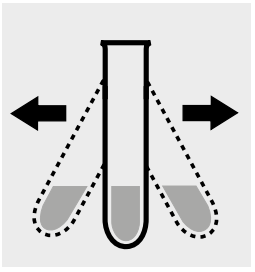
Pipette 2.0 ml of **F-1** into a test tube.



Add 5.0 ml of water and 0.5 ml of the sample with pipette and mix.

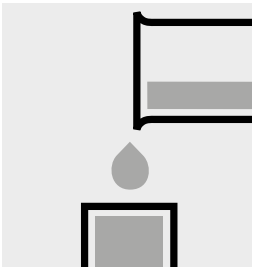


Add 1 level microspoon of **F-2** and mix.

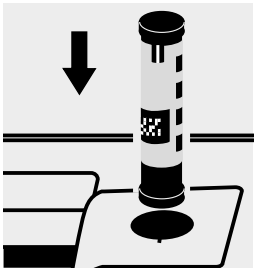


Shake the test tube vigorously to dissolve the solid substance.

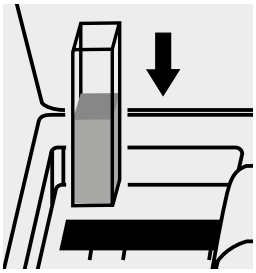
Reaction time:
5 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 1.0 – 20.0 mg/l F.



Place the cell into the cell compartment.

Important:

Very high fluoride concentrations in the sample produce brown-colored solutions (measurement solution should be violet) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

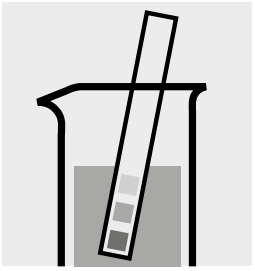
To check the measurement system (test reagents, measurement device, and handling) ready-to-use fluoride standard solution Certipur®, Cat.No. 1.19814, concentration 1000 mg/l F^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32233, 1.32234, 1.32235, and 1.32236.

Fluoride

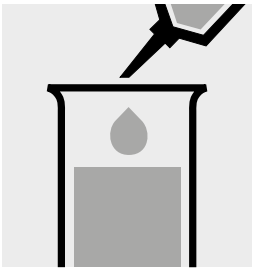
1.00822

Test

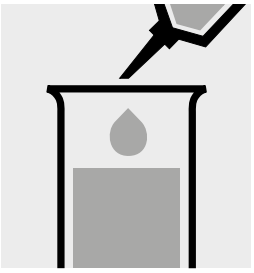
Measuring range:	0.02 – 2.00 mg/l F	50-mm semi-microcell, Cat. No. 1.73502
	Expression of results also possible in mmol/l.	



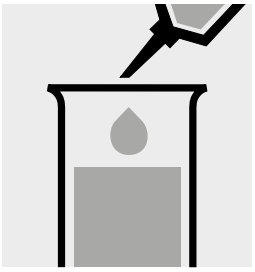
Check the pH of the sample, specified range: pH 1 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

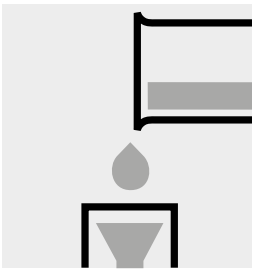


Pipette 5.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a second test tube.
(Blank)

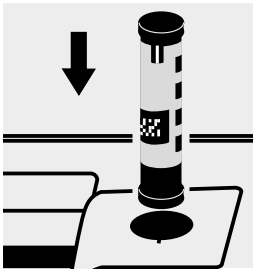


Add to each tube 1.0 ml of **F-1** with pipette and mix.

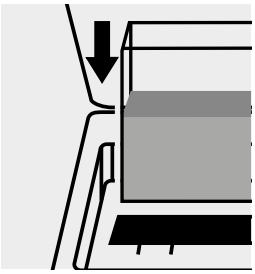
Reaction time:
1 minute



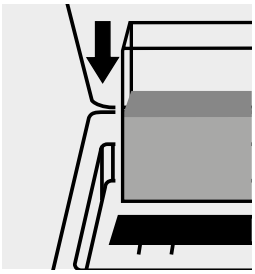
Transfer both solutions into a separate **semi-microcell**.



Select method with AutoSelector.



Place the blank cell into the cell compartment.



Place the cell containing the sample into the cell compartment.

Important:

For measurement in the 50-mm **rectangular cell, Cat. No. 1.14944**, the sample volume and the volume of the reagent must be doubled for each.

Quality assurance:

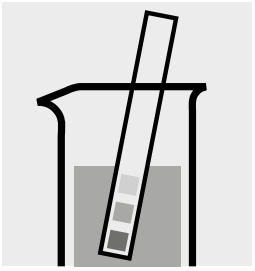
To check the measurement system (test reagents, measurement device, and handling) ready-to-use fluoride standard solution Certipur®, Cat.No. 1.19814, concentration 1000 mg/l F^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32233, 1.32234, 1.32235, and 1.32236.

Fluoride

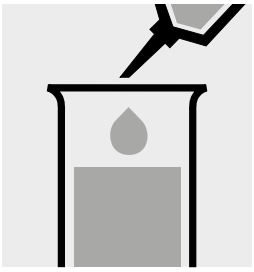
1.17236

Test

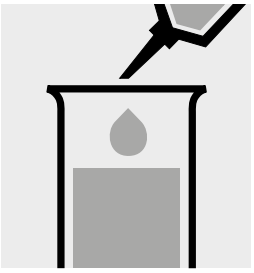
Measuring range:	0.02 – 2.00 mg/l F	50-mm semi-microcell, Cat. No. 1.73502
	Expression of results also possible in mmol/l.	



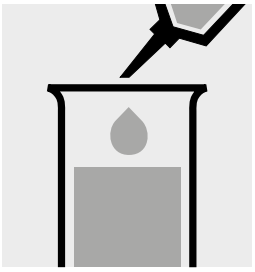
Check the pH of the sample, specified range: pH 2 – 12.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

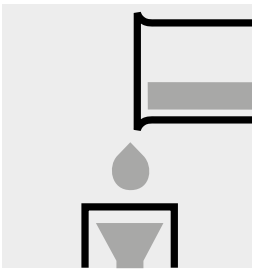


Pipette 5.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a second test tube.
(Blank)

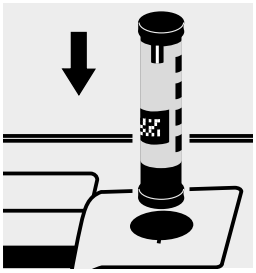


Add to each tube 1.0 ml of **F-1** with pipette and mix.

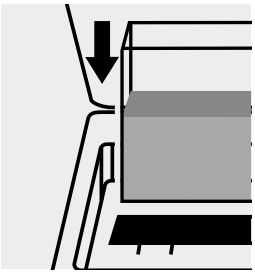
Reaction time:
1 minute



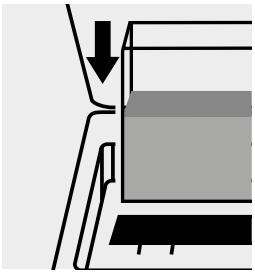
Transfer both solutions into a separate **semi-microcell**.



Select method with AutoSelector.



Place the blank cell into the cell compartment.



Place the cell containing the sample into the cell compartment.

Important:

For measurement in the 50-mm **rectangular cell, Cat. No. 1.14944**, the sample volume and the volume of the reagent must be doubled for each.

Quality assurance:

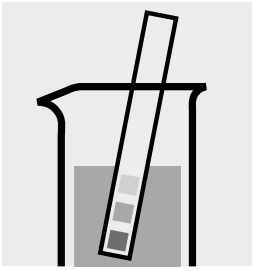
To check the measurement system (test reagents, measurement device, and handling) ready-to-use fluoride standard solution Certipur®, Cat.No. 1.19814, concentration 1000 mg/l F^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32233, 1.32234, 1.32235, and 1.32236.

Formaldehyde

1.14500

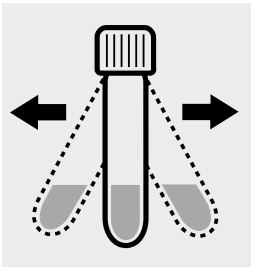
Cell Test

Measuring range:	0.10 – 8.00 mg/l HCHO Expression of results also possible in mmol/l.

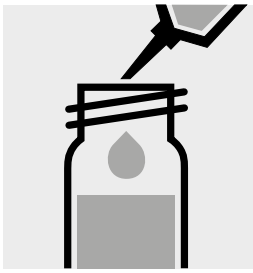


Check the pH of the sample, specified range: pH 0 – 13.

Add 1 level green micro-spoon of **HCHO-1K** into a reaction cell, close with the screw cap.

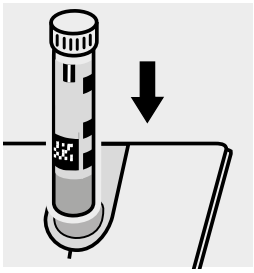


Shake the cell vigorously to dissolve the solid substance.



Add 2.0 ml of the sample with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time: 5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high formaldehyde concentrations (exceeding 1000 mg/l) in the sample yield false readings. In such cases the sample must be diluted (plausibility check).

Quality assurance:

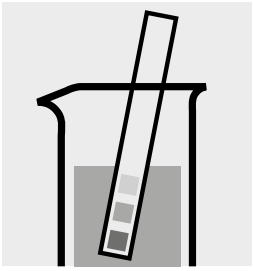
To check the measurement system (test reagents, measurement device, and handling) a formaldehyde standard solution must be prepared from Formaldehyde solution 37%, Cat.No. 1.04003 (see section "Standard solutions").

Formaldehyde

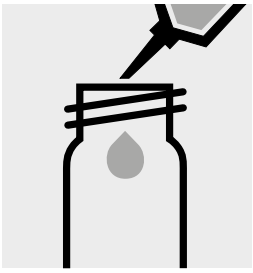
1.14678

Test

Measuring	0.10 – 8.00 mg/l HCHO	10-mm cell
range:	0.05 – 4.00 mg/l HCHO	20-mm cell
	0.02 – 1.50 mg/l HCHO	50-mm cell
	Expression of results also possible in mmol/l.	

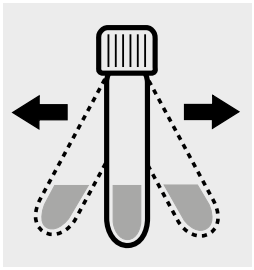


Check the pH of the sample, specified range: pH 0 – 13.

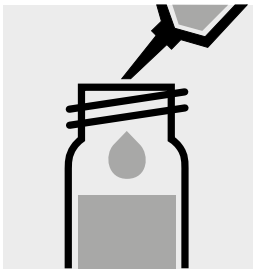


Pipette 4.5 ml of **HCHO-1** into an empty round cell (Empty cells, Cat.No. 1.14724).

Add 1 level green micro-spoon of **HCHO-2**, close the cell with the screw cap.

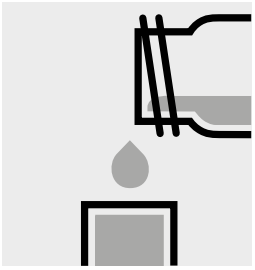


Shake the cell vigorously to dissolve the solid substance.

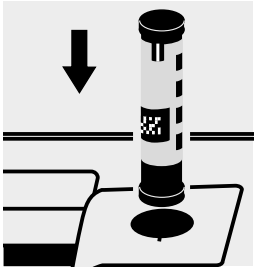


Add 3.0 ml of the sample with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

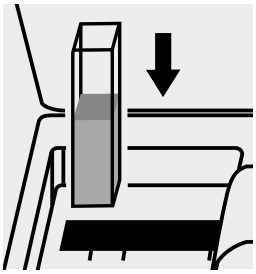
Reaction time: 5 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Important:

Very high formaldehyde concentrations (exceeding 1000 mg/l) in the sample yield false readings. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a formaldehyde standard solution must be prepared from Formaldehyde solution 37%, Cat.No. 1.04003 (see section "Standard solutions").

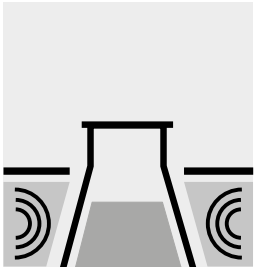
Gardner Color Measurement

Application

analogous to **ASTM D6166 and EN ISO 4630-2**

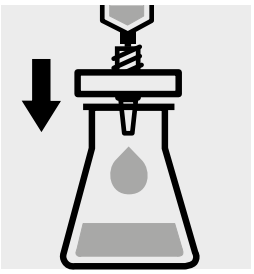
Measuring range:	1.0 – 18.0 Gardner Color	10-mm cell	Method No. 2561
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment pre-		
	pared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This		
	zero value remains valid until the method is exited.		

Preparation:



Contains the sample air or gas bubbles: degassing in ultrasonic bath.

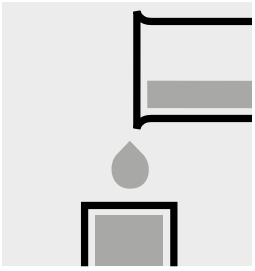
Melt solid samples and homogenize.



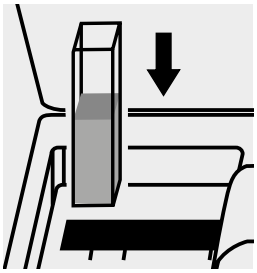
Filter or centrifuge turbid samples.

Determination:

Select method no. **2561**. Perform the zero adjustment and confirm by pressing the <OK> button.

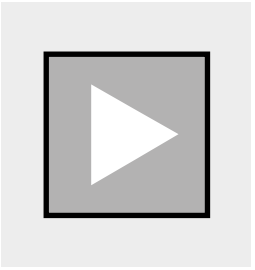


Transfer the solution into the cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. Gardner Color is shown in the display.



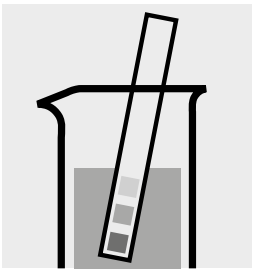
Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Gold

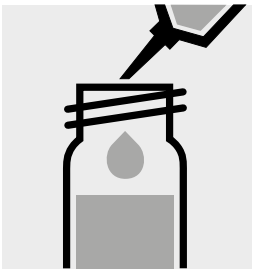
1.14821

Test

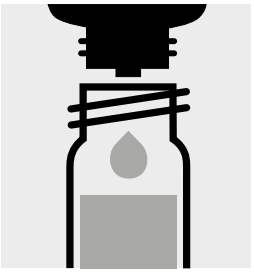
Measuring range:	0.5 – 12.0 mg/l Au Expression of results also possible in mmol/l.	10-mm cell



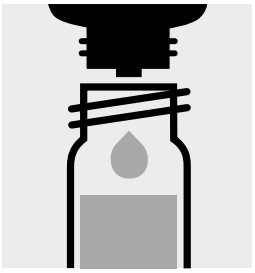
Check the pH of the sample, specified range: pH 1 – 9.
If required, add dilute hydrochloric acid drop by drop to adjust the pH.



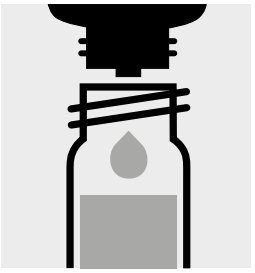
Pipette 2.0 ml of the sample into a test tube with screw cap.



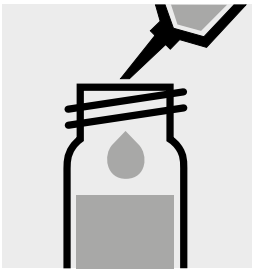
Add 2 drops of **Au-1** and mix.



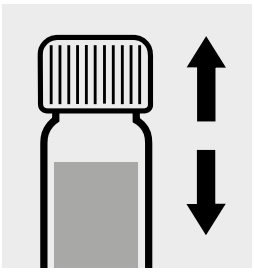
Add 4 drops of **Au-2** and mix.



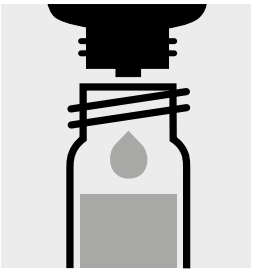
Add 6 drops of **Au-3** and mix.



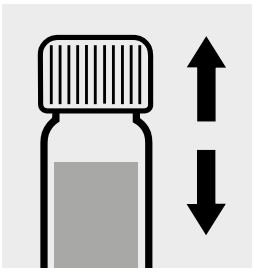
Add 6.0 ml of **Au-4** with pipette, close with the screw cap.



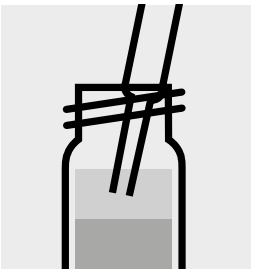
Shake the tube vigorously for 1 minute.



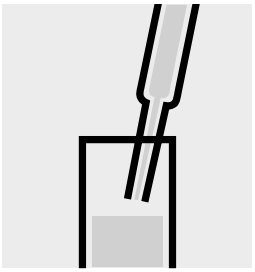
Add 6 drops of **Au-5**, close with the screw cap.



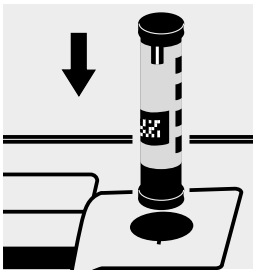
Shake the tube vigorously for 1 minute.



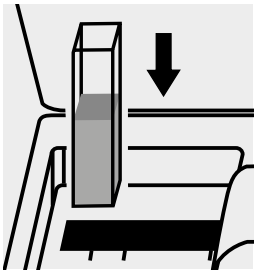
Aspirate the clear upper phase from the tube with pipette.



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

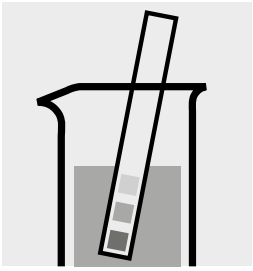
To check the measurement system (test reagents, measurement device, and handling) ready-to-use gold standard solution Certipur®, Cat.No. 1.70216, concentration 1000 mg/l Au, can be used after diluting accordingly.

Hydrazine

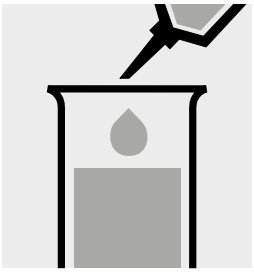
1.09711

Test

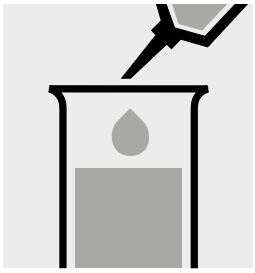
Measuring	0.02 – 2.00	mg/l N_2H_4	10-mm cell
range:	0.01 – 1.00	mg/l N_2H_4	20-mm cell
	0.005 – 0.400	mg/l N_2H_4	50-mm cell
	Expression of results also possible in mmol/l.		



Check the pH of the sample, specified range: pH 2 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

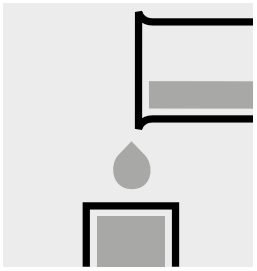


Pipette 5.0 ml of the sample into a test tube.

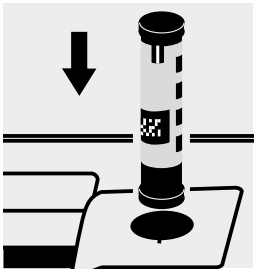


Add 2.0 ml of **Hy-1** with pipette and mix.

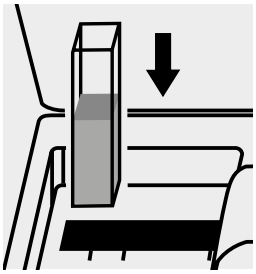
Reaction time:
5 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a hydrazine standard solution must be prepared from Hydrazinium sulfate GR, Cat.No. 1.04603 (see section "Standard solutions").

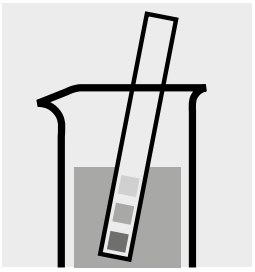
Hydrogen Peroxide

1.14731

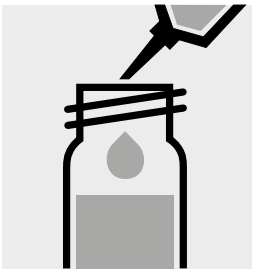
Cell Test

Measuring range:	2.0 – 20.0 mg/l H_2O_2	Round cell
	0.25 – 5.00 mg/l H_2O_2	50-mm cell
	Expression of results also possible in mmol/l.	

Measuring range: 2.0 – 20.0 mg/l H_2O_2

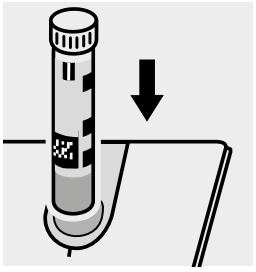


Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



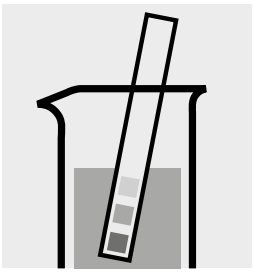
Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.

Reaction time:
2 minutes



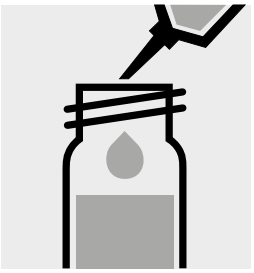
Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Measuring range: 0.25 – 5.00 mg/l H_2O_2



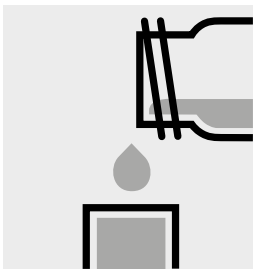
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.

Select method no. **128**.

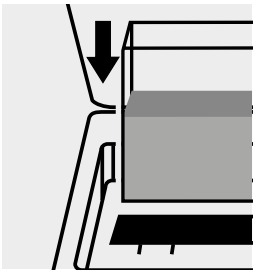


Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.

Reaction time:
2 minutes



Transfer the solution into a 50-mm cell.



Place the cell into the cell compartment.

Important:

The contents of the reaction cells may be slightly yellow. However, this does not influence the measurement result.

Quality assurance:

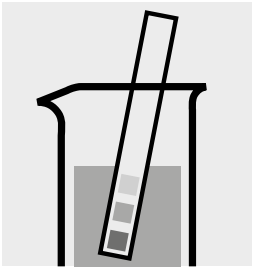
To check the measurement system (test reagents, measurement device, and handling) a hydrogenperoxide standard solution must be prepared from Perhydrol® 30% H_2O_2 GR, Cat.No. 1.07209 (see section "Standard solutions").

Hydrogen Peroxide

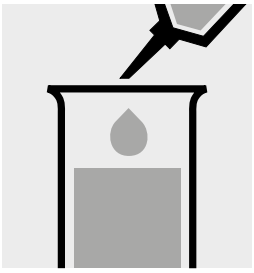
1.18789

Test

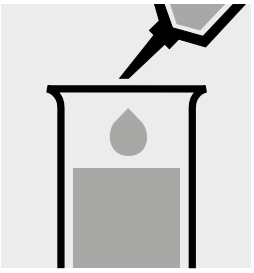
Measuring range:	0.03 – 6.00 mg/l H_2O_2	10-mm cell
	0.015 – 3.000 mg/l H_2O_2	20-mm cell
	Expression of results also possible in mmol/l.	



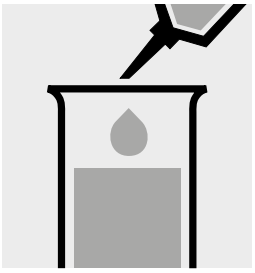
Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 0.50 ml of **H_2O_2-1** into a test tube.

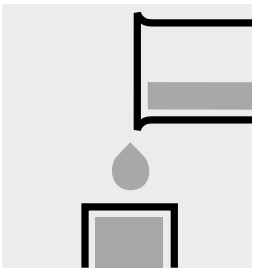


Add 8.0 ml of the sample with pipette and mix.

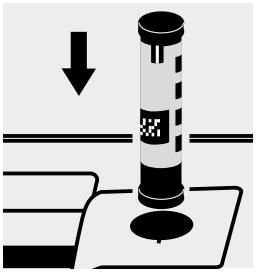


Add 0.50 ml of **H_2O_2-2** with pipette and mix.

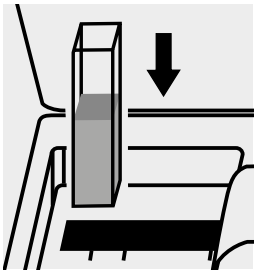
Reaction time: 10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a hydrogenperoxide standard solution must be prepared from Perhydrol® 30% H_2O_2 GR, Cat.No. 1.07209 (see section "Standard solutions").

Hydroxyproline

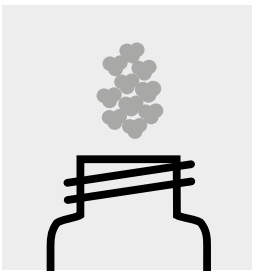
in meat, meat products and sausages

corresponds to **German Food and Feed Code §64 LFGB 06.00-8**

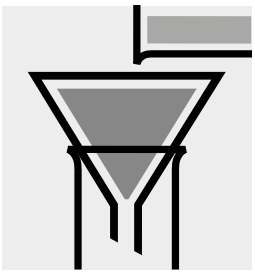
Application

Measuring range:	0.000 – 1.000 g/100 g	10-mm cell	Method No. 2538
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Preparation:
Acid hydrolysis and fat separation

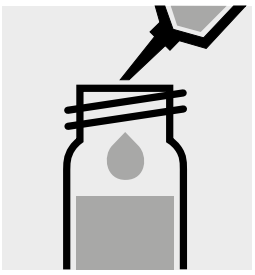


Weigh approx. 2 g of sample, accurately weighed to 1 mg, into a DURAN® glass bottle and process acc. to §64 LFGB 06.00-8, section 7.1 [1].

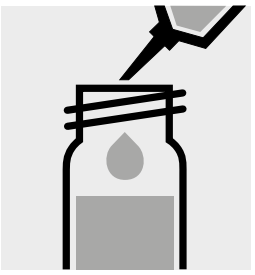


Use the resultant filtrate: **pretreated sample solution**.

Hydroxyproline determination:
Reagent blank

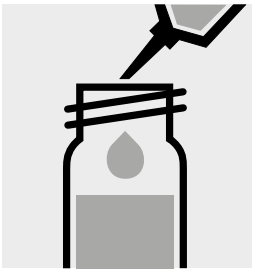


Pipette 0.100 ml of distilled water (Water for analysis EMSURE®, Cat. No. 1.16754, is recommended) into a test tube with screw cap.

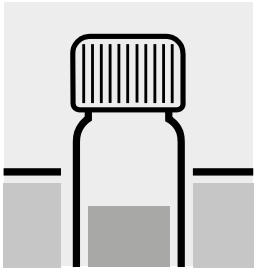


Add 5 ml of **oxidizing reagent** and mix.

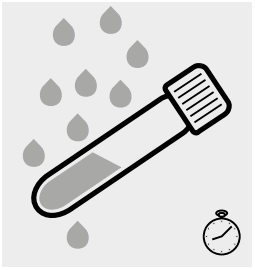
Incubation time:
20 minutes at room temperature



Add 2 ml of **color reagent**, close the test tube with the screw cap, and mix.



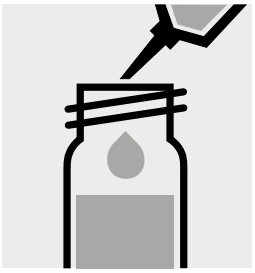
Incubate in the water bath at 60 °C for 15 minutes.



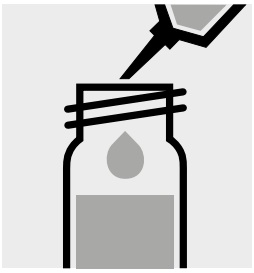
Cool under running water to room temperature within 3 minutes.

Incubation time:
30 minutes at room temperature:
reagent blank

Hydroxyproline determination:
Measurement sample

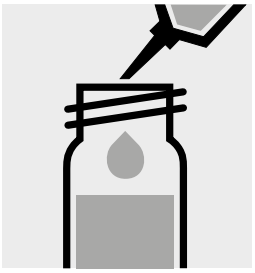


Pipette 0.100 ml of pretreated sample (filtrate) into a test tube with screw cap.

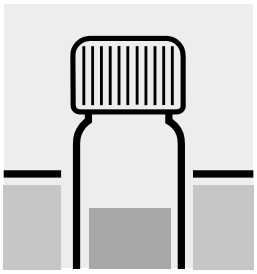


Add 5 ml of **oxidizing reagent** and mix.

Incubation time:
20 minutes at room temperature



Add 2 ml of **color reagent**, close the test tube with the screw cap, and mix.



Incubate in the water bath at 60 °C for 15 minutes.

Hydroxyproline

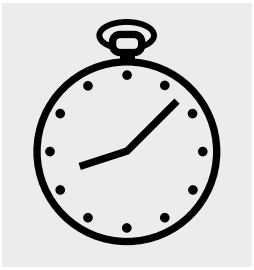
in meat, meat products and sausages

corresponds to **German Food and Feed Code §64 LFGB 06.00-8**

Application

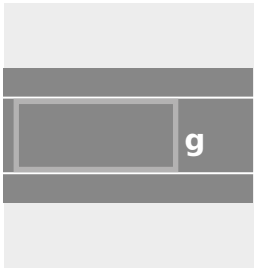
Measurement:

Cool under running water to room temperature within 3 minutes.



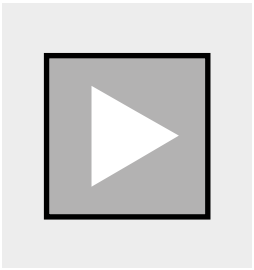
Incubation time:
30 minutes at room temperature:
measurement sample

Select method no. **2538**. Perform the zero adjustment and confirm by pressing the <OK> button.

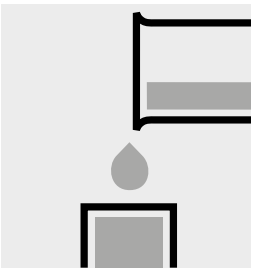


Enter the sample weight in grams.

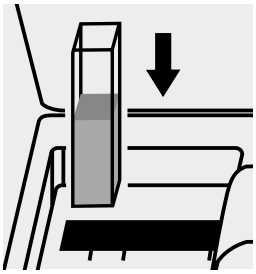
Confirm with <OK>.



Tap the <Start> button.

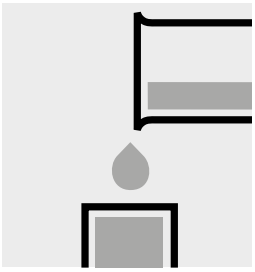


Transfer the solution **"reagent blank"** into the cell.

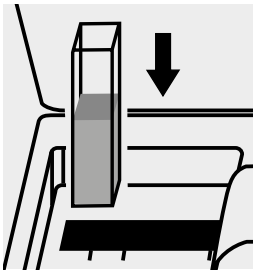


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.

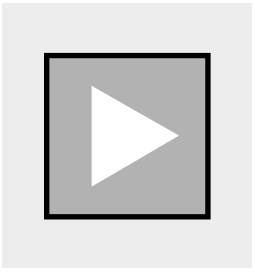


Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

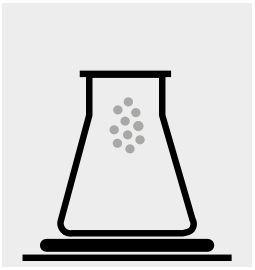
ICUMSA Color

Color of sugar solutions

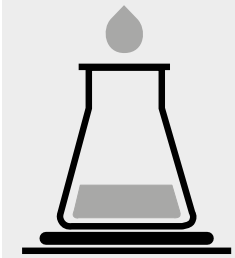
corresponds to **ICUMSA method GS1/3-7 (2011)**

Application

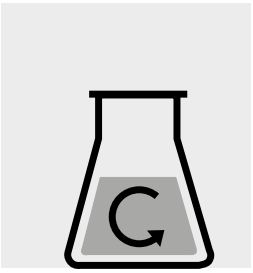
Measuring	0 – 50 000 $IU_{7.0}$	10-mm cell	Method No. 2548
range:	0 – 25 000 $IU_{7.0}$	20-mm cell	Method No. 2548
	0 – 10 000 $IU_{7.0}$	50-mm cell	Method No. 2548
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared		
	from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This zero value		
	remains valid until the method is exited.		



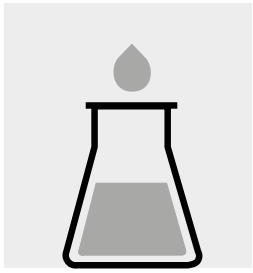
Weigh in **5.0 g of homogenized sample**, accurately weighed to 0.1 g, or **10/30/50 g of homogenized sample**, accurately weighed to 1 g, depending on the anticipated color value.



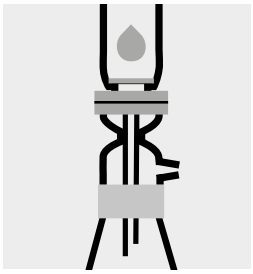
Add **distilled water** (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) until a **total volume of 100 g** is achieved



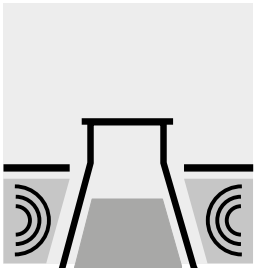
Dissolve the sample at room temperature.



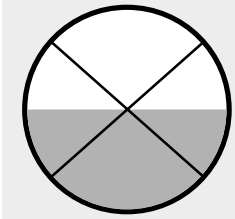
Adjust the pH of the prepared sample with sodium hydroxide solution 0.1 mol/l (Cat. No. 1.09141) or, respectively, hydrochloric acid 0.1 mol/l (Cat. No. 1.09060) to 7.0 ± 0.1.



Vacuum-filter **the adjusted solution** over a membrane filter into a clean and dry conical flask.

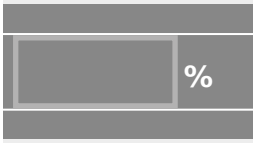


Degas for **3 minutes** in the ultrasonic bath.



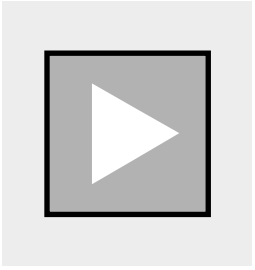
Determine the **% RDS value** (refractometric dry substance) of the solution.

Select method no. **2548**. Perform the zero adjustment and confirm by pressing the <OK> button.

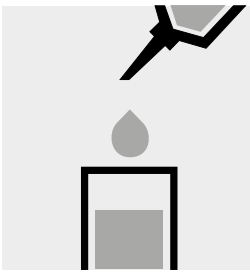


Enter the RDS value in %.

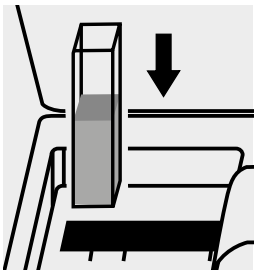
Confirm with <OK>.



Tap the <Start> button.

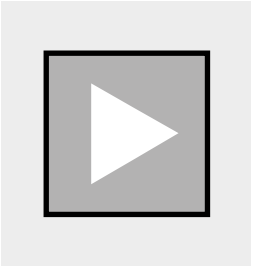


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The $IU_{7.0}$ value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

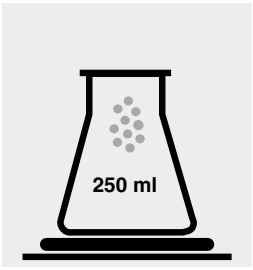
ICUMSA Color

Color of sugar solutions at pH 7.0

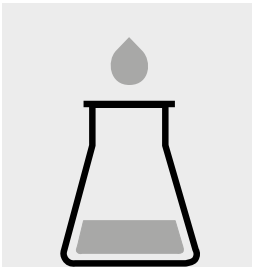
corresponds to **ICUMSA method GS2/3-9 (2005)**

Application

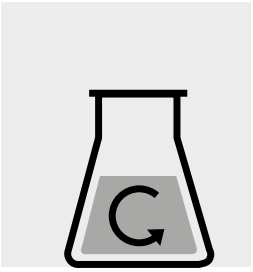
Measuring range:	0 – 600 $IU_{7.0}$	50-mm cell, 100-mm cell	Method No. 2549
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from buffer solution, is recommended. This zero value remains valid until the method is exited.		



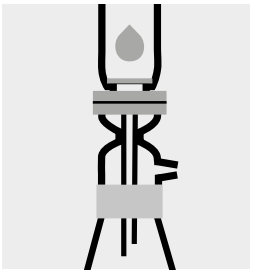
Weigh **50.0 ± 0.1 g of homogenized sample** into a 250-ml conical flask.



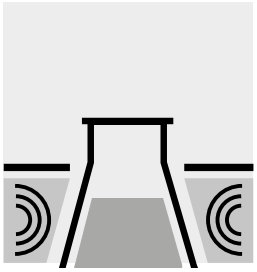
Add **50.0 ± 0.1 g of buffer solution**.



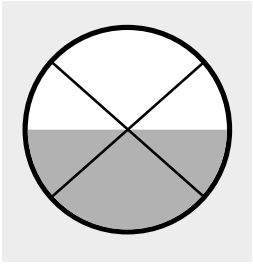
Dissolve the sample at room temperature.



Vacuum-filter **the pre-treated solution** over a membrane filter into a clean and dry conical flask.

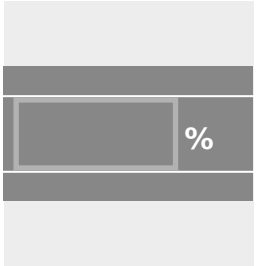


Degas for **3 minutes** in the ultrasonic bath.



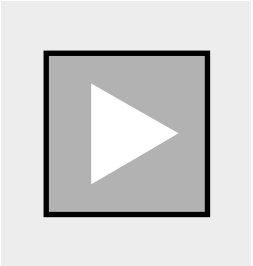
Determine the **% RDS value** (refractometric dry substance) of the solution.

Select method no. **2549**. Perform the zero adjustment and confirm by pressing the <OK> button.

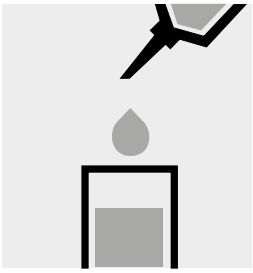


Enter the RDS value in %.

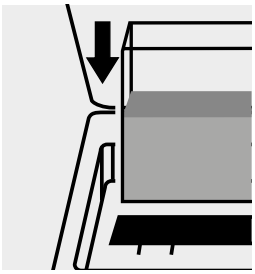
Confirm with <OK>.



Tap the <Start> button.

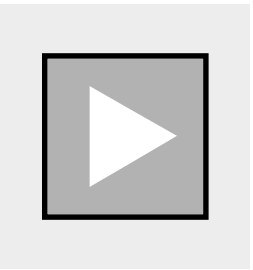


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The $IU_{7.0}$ value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Note:

When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

Important:

The exact procedure and the composition and preparation of the buffer solution used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

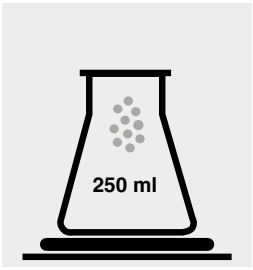
ICUMSA Color

Color of sugar solutions of white sugar

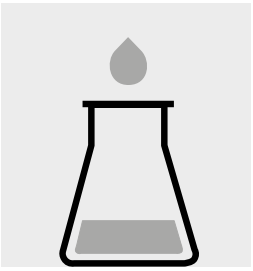
corresponds to **ICUMSA method GS2/3-10 (2011)**

Application

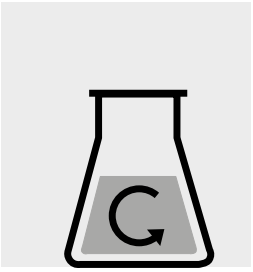
Measuring range:	0 – 50 $IU_{7.0}$	50-mm cell, 100-mm cell	Method No. 2550
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This		
	zero value remains valid until the method is exited.		



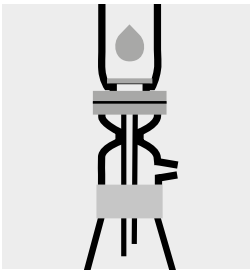
Weigh **50.0 ± 0.1 g of homogenized sample** into a 250-ml conical flask.



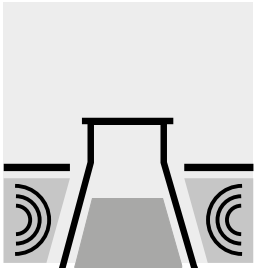
Add **50.0 ± 0.1 g of distilled water** (Water for analysis EMSURE®, Cat. No. 1.16754, is recommended).



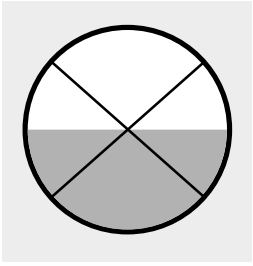
Dissolve the sample at room temperature.



Vacuum-filter **the pretreated solution** over a membrane filter into a clean and dry conical flask.

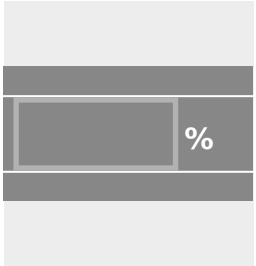


Degas for **3 minutes** in the ultrasonic bath.



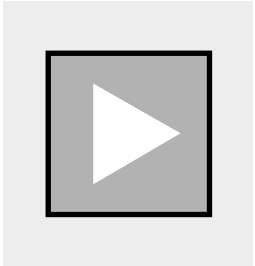
Determine the **% RDS value** (refractometric dry substance) of the solution.

Select method no. **2550**. Perform the zero adjustment and confirm by pressing the <OK> button.

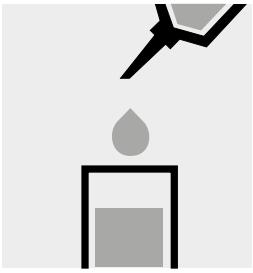


Enter the RDS value in %.

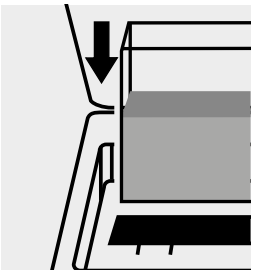
Confirm with <OK>.



Tap the <Start> button.



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The $IU_{7.0}$ value is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Note:

When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

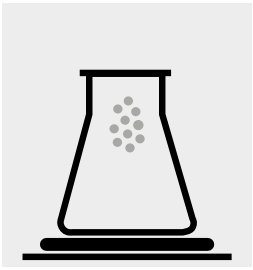
ICUMSA Color

Color of sugar solutions at pH 7.0

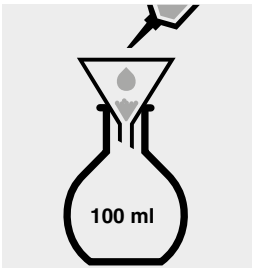
corresponds to **ICUMSA method GS9/1/2/3-8 (2011) (MOPS buffer method)**

Application

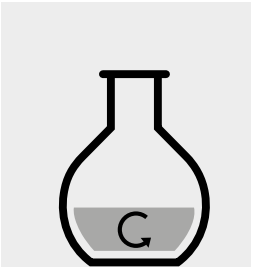
Measuring	0 – 20 000 $IU_{7.0}$	10-mm cell	Method No. 2551
range:	0 – 10 000 $IU_{7.0}$	20-mm cell	Method No. 2551
	0 – 4 000 $IU_{7.0}$	50-mm cell	Method No. 2551
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared		
	from reference solution, is recommended. This zero value remains valid until the method is exited.		



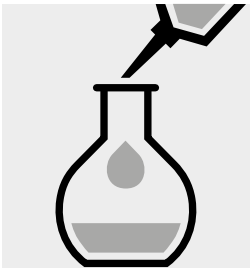
Weigh in **5.0/10.0/20.0 g of homogenized sample**, accurately weighed to 0.1 g, depending on the anticipated color value.



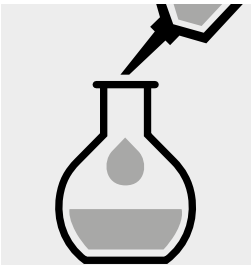
Transfer the sample to a 100-ml volumetric flask by rinsing with **80 ml of distilled water** (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended).



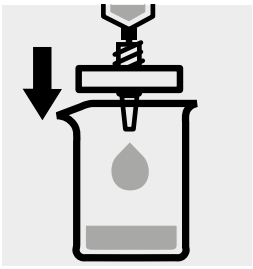
Dissolve the sample at room temperature.



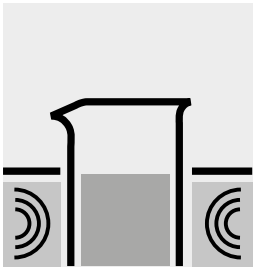
Add **10.0 ml of MOPS buffer**.



Make up the contents of the volumetric flask to the mark with **distilled water** (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix.

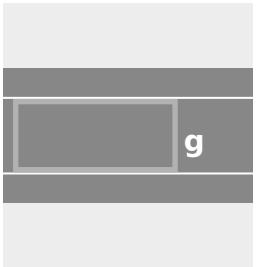


Filter **10 - 20 ml of the pretreated solution** over a membrane filter into a clean and dry beaker.



Degas for **3 minutes** in the ultrasonic bath.

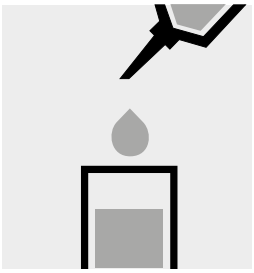
Select method no. **2551**. Perform the zero adjustment and confirm by pressing the <OK> button.



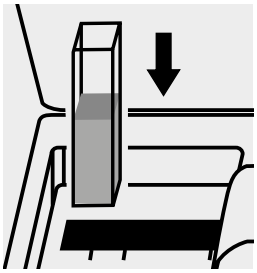
Enter the sample weight in grams.

Confirm with <OK>.

Tap the <Start> button.



Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The $IU_{7.0}$ value is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

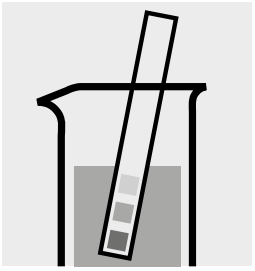
The exact procedure and the composition and preparation of the buffer and reference solution used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

Iodine

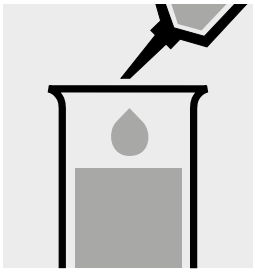
1.00606

Test

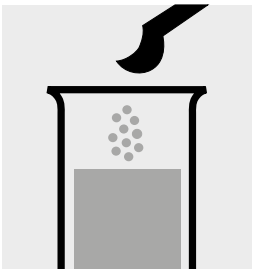
Measuring range:	0.20 – 10.00 mg/l I_2	10-mm cell
	0.10 – 5.00 mg/l I_2	20-mm cell
	0.050 – 2.000 mg/l I_2	50-mm cell
	Expression of results also possible in mmol/l.	



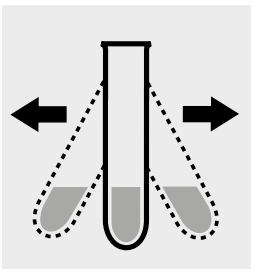
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 10 ml of the sample into a test tube.

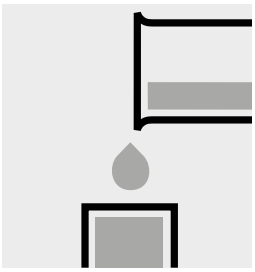


Add 1 level blue micro-spoon of **I_2-1**.

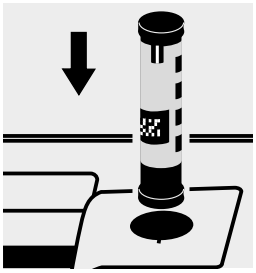


Shake vigorously to dissolve the solid substance.

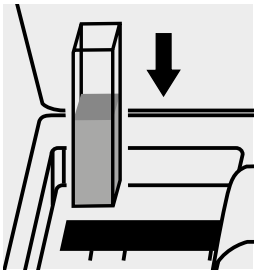
Reaction time: 1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high iodine concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

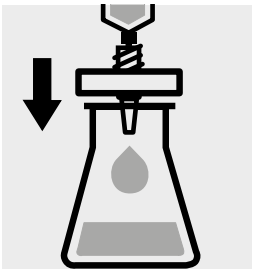
Note:

Iodine can also be determined with Spectroquant® Chlorine Test, Cat. No. 1.00598 (see corresponding application notes on www.sigmaaldrich.com).

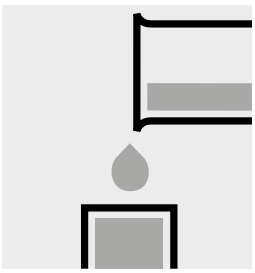
Iodine Color Number

analogous to **DIN 6162A**

Measuring	0.05 – 3.00	340 nm	10-mm cell	Method No. 33
range:	0.03 – 1.50	340 nm	20-mm cell	Method No. 33
	0.010 – 0.600	340 nm	50-mm cell	Method No. 33

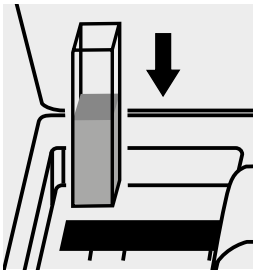


Filter turbid samples.



Transfer the solution into a corresponding cell.

Select method no. **33**.

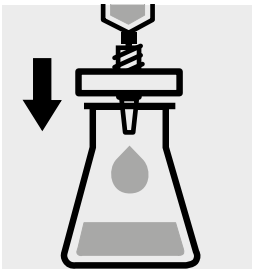


Place the cell into the cell compartment.
The measurement is performed automatically.

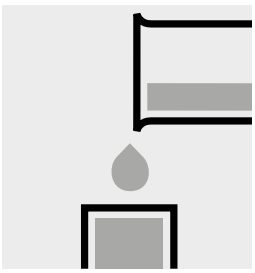
Iodine Color Number

analogous to **DIN 6162A**

Measuring	1.0 – 50.0	445 nm	10-mm cell	Method No. 21
range:	0.5 – 25.0	445 nm	20-mm cell	Method No. 21
	0.2 – 10.0	445 nm	50-mm cell	Method No. 21

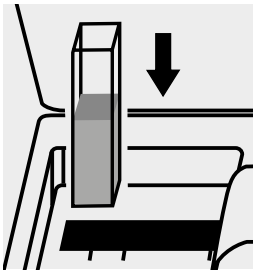


Filter turbid samples.



Transfer the solution into a corresponding cell.

Select method no. **21**.



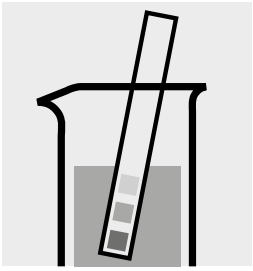
Place the cell into the cell compartment.
The measurement is performed automatically.

Iron

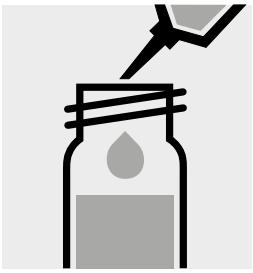
1.14549

Cell Test

Measuring range:	0.05 – 4.00 mg/l Fe Expression of results also possible in mmol/l.

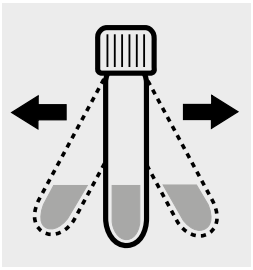


Check the pH of the sample, specified range: pH 1 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



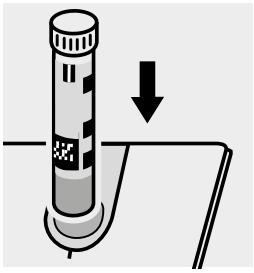
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level blue micro-spoon of **Fe-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 3 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total iron** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of iron (Σ Fe).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.33018, 1.33019 and 1.33020.

Ready-to-use iron standard solution Certipur®, Cat.No. 1.19781, concentration 1000 mg/l Fe, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Iron

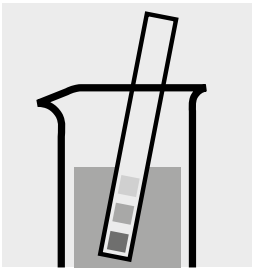
Determination of iron(II) and iron(III)

1.14896

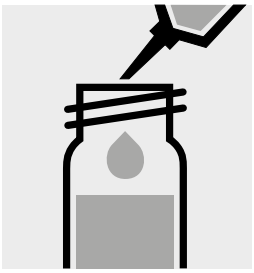
Cell Test

Measuring range:	1.0 – 50.0 mg/l Fe Expression of results also possible in mmol/l.

Determination of iron (II)

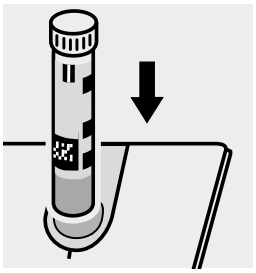


Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



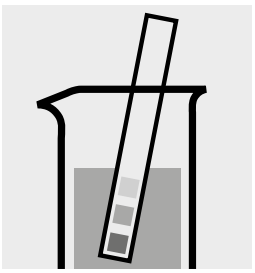
Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Reaction time:
5 minutes

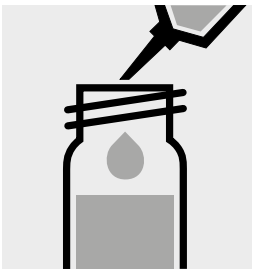


Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

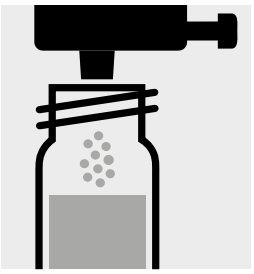
Determination of iron (II + III)



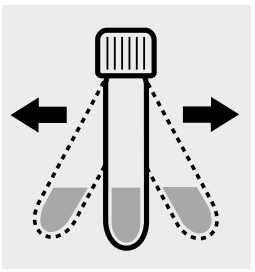
Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

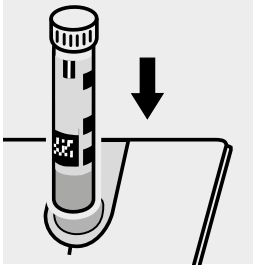


Add 1 dose of **Fe-1K** using the blue dose-metering cap, close the reaction cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total iron** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of iron (Σ Fe).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use iron standard solution Certipur®, Cat.No. 1.19781, concentration 1000 mg/l Fe(III), can be used after diluting accordingly.

Iron

Differentiation between iron(II) and iron(III)

1.14896

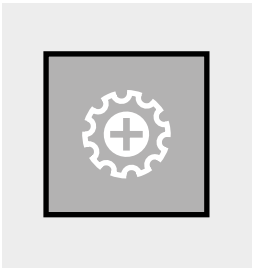
Cell Test

Measuring range: 1.0 – 50.0 mg/l Fe

If the aim is to differentiate between iron(II) and iron(III), after selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **106**.

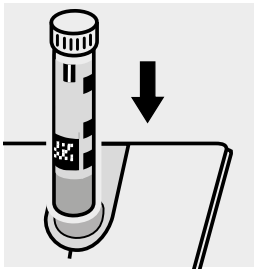


Tap the <Settings> button.
Select "Differentiation" and activate.

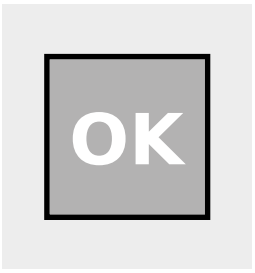
Confirm with <OK>.

Perform determination of **iron(II + III)** (see analytical procedure "Determination of iron(II + III)" with 1.14896).
= cell A

After the reaction time has expired:



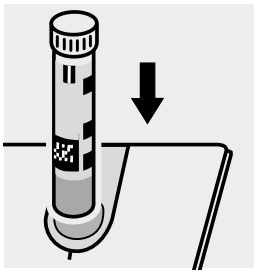
Place the **cell A** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.



Confirm with <OK>.

Perform determination of **iron(II)** (see analytical procedure "Determination of iron(II)" with 1.14896).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.

Confirm with <OK>.
The results A (Fe(II+III)), B (Fe(II)), and C (Fe(III)) are shown in the display in mg/l.

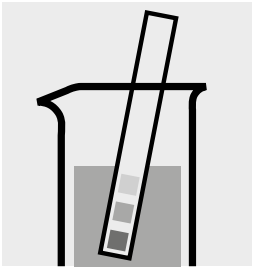
Iron

1.14761

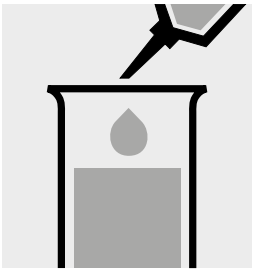
Test

Measuring	0.05	– 5.00	mg/l Fe	10-mm cell
range:	0.03	– 2.50	mg/l Fe	20-mm cell
	0.005	– 1.000	mg/l Fe	50-mm cell
	0.0025	– 0.5000	mg/l Fe	100-mm cell
	Expression of results also possible in mmol/l.			

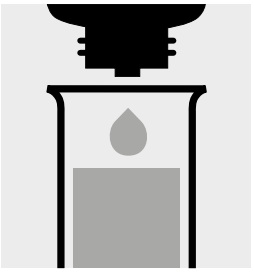
Measuring ranges: 0.005 – 5.00 mg/l Fe



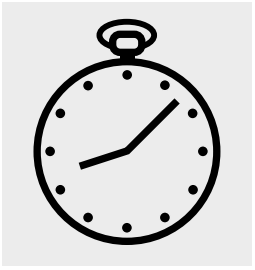
Check the pH of the sample, specified range: pH 1 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



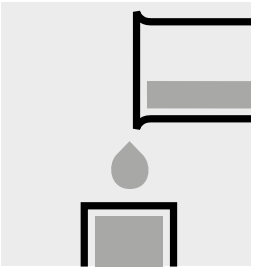
Pipette 5.0 ml of the sample into a test tube.



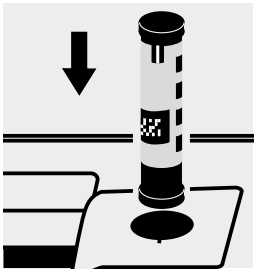
Add 3 drops of **Fe-1** and mix.



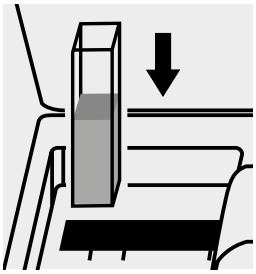
Reaction time:
3 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total iron** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of iron (Σ Fe).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.33014, 1.33018, 1.33019 and 1.33020.

Ready-to-use iron standard solution Certipur®, Cat.No. 1.19781, concentration 1000 mg/l Fe, can also be used after diluting accordingly.

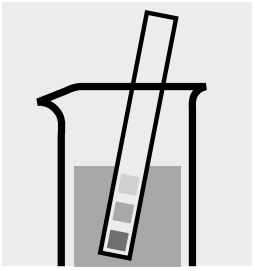
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Iron

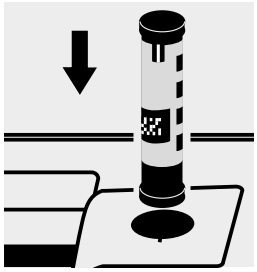
1.14761

Test

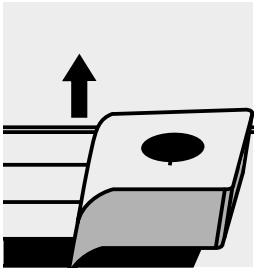
Measuring range: 0.0025 – 0.5000 mg/l Fe



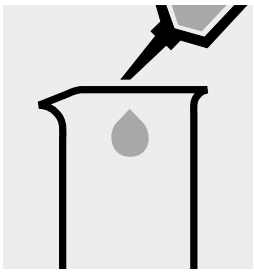
Check the pH of the sample, specified range: pH 1 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



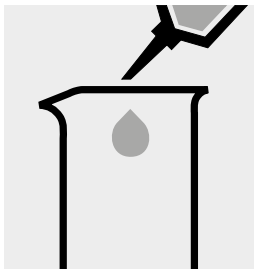
Select method with AutoSelector.



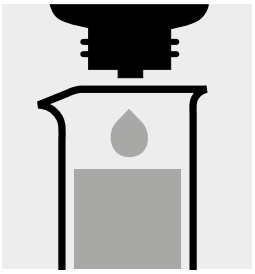
Remove the round-cell holder.



Place 20 ml of sample into a suitable vessel.

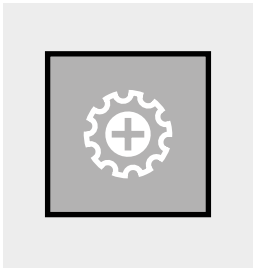


Place 20 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754 is recommended) into a second suitable vessel.
(Blank)

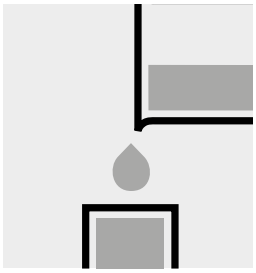


Add to each vessel 12 drops of **Fe-1** and mix.

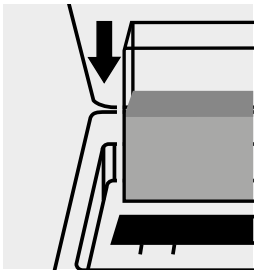
Reaction time:
3 minutes



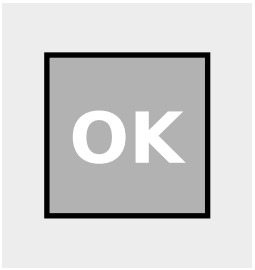
Tap the <Settings> button.
Select "Reagent blank".



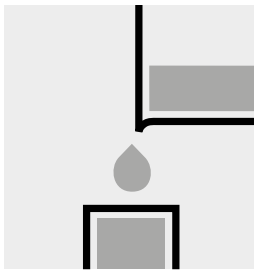
Transfer the blank into the cell.



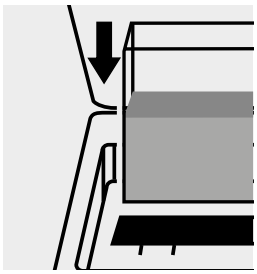
Insert the blank cell into the cell compartment.



Select "User RB".
Confirm with <OK>.



Transfer the measurement sample into the cell.



Insert the cell containing the sample into the cell compartment.

Important:

If the sample have been **preserved with nitric acid**, it may be necessary to offset the water used for the blank in the same proportion with nitric acid.
Nitric acid may contain traces of iron and discoloration.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use iron standard solution Certipur®, Cat.No. 1.19781, concentration 1000 mg/l Fe, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32214, 1.33018, and 1.33019.

Iron

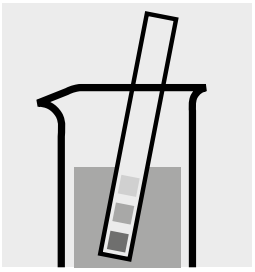
Determination of iron(II) and iron(III)

1.00796

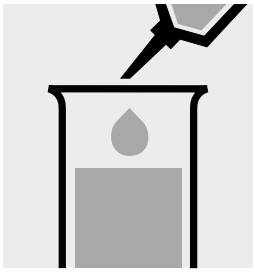
Test

Measuring	0.10 – 5.00	mg/l Fe	10-mm cell
range:	0.05 – 2.50	mg/l Fe	20-mm cell
	0.010 – 1.000	mg/l Fe	50-mm cell
	Expression of results also possible in mmol/l.		

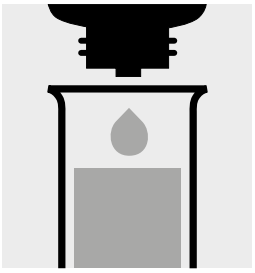
Determination of iron(II)



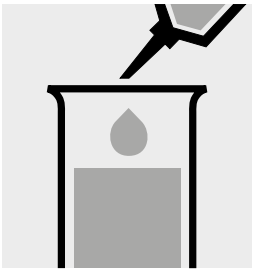
Check the pH of the sample, specified range: pH 2 – 8.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.



Pipette 8.0 ml of the sample into a test tube.

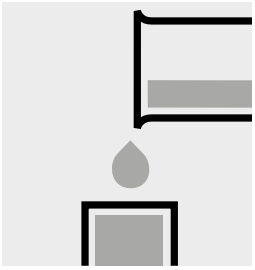


Add 1 drop of **Fe-1** and mix.

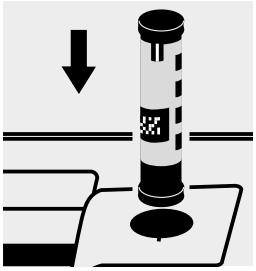


Add 0.50 ml of **Fe-2** with pipette and mix.

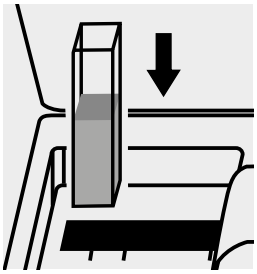
Reaction time: 5 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

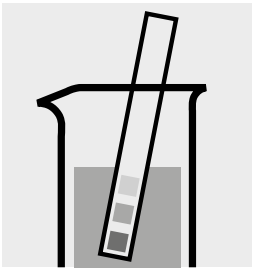
Iron

Determination of iron(II) and iron(III)

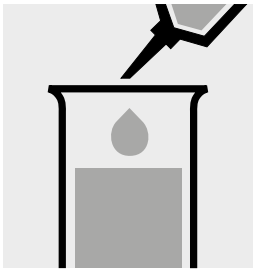
1.00796

Test

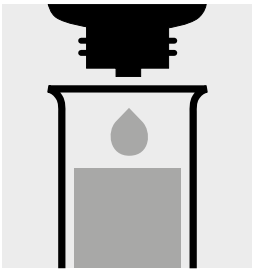
Determination of iron(II + III)



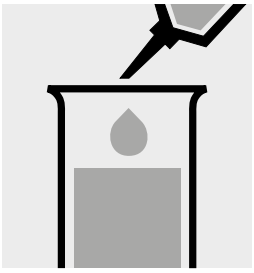
Check the pH of the sample, specified range: pH 2 – 8.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.



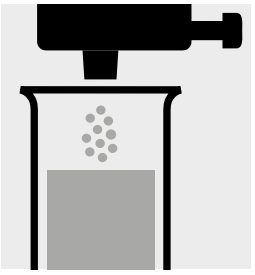
Pipette 8.0 ml of the sample into a test tube.



Add 1 drop of **Fe-1** and mix.

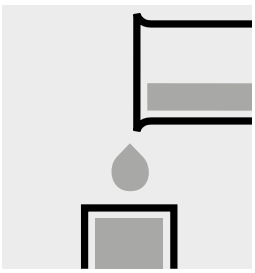


Add 0.50 ml of **Fe-2** with pipette and mix.

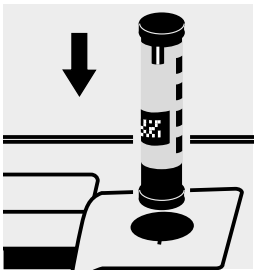


Add 1 dose of **Fe-3** using the blue dose-metering cap and dissolve the solid substance.

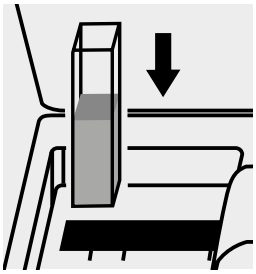
Reaction time:
10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total iron** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.33014, 1.33018, 1.33019 and 1.33020.

Ready-to-use iron standard solution Certipur®, Cat.No. 1.19781, concentration 1000 mg/l Fe(III), can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Iron

Differentiation between iron(II) and iron(III)

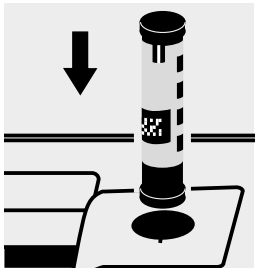
1.00796

Test

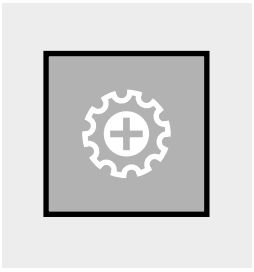
Measuring	0.10 – 5.00	mg/l Fe	10-mm cell
range:	0.05 – 2.50	mg/l Fe	20-mm cell
	0.010 – 1.000	mg/l Fe	50-mm cell

If the aim is to differentiate between iron(II) and iron(III), after selecting the method it is possible to set the method-specific "Differentiation" mode.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.



Select method with AutoSelector.

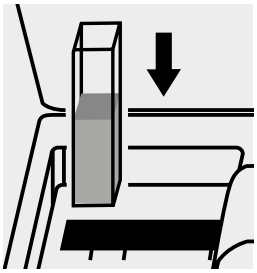


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **iron(II + III)** (see analytical procedure "Determination of iron(II + III)" with 1.00796).
= cell A

After the reaction time has expired:

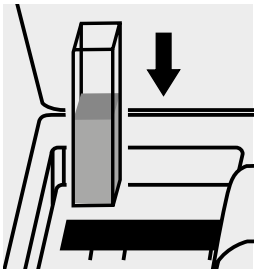


Place the **cell A** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **iron(II)** (see analytical procedure "Determination of iron(II)" with 1.00796).
= cell B

After the reaction time has expired:



Place the **cell B** into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Fe(II+III)), B (Fe(II)), and C (Fe(III)) are shown in the display in mg/l.

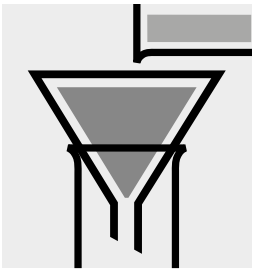
$K_{232\ nm}$ of olive oil

corresponds to **Commission Regulation (EEC) No 2568/91 Annex IX**

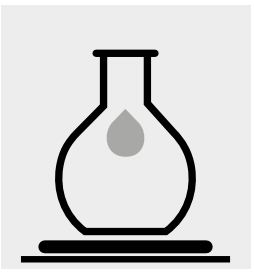
Application

Measuring range:	0 – 4.00 K_{232}	10-mm quartz cell	Method No. 2525
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from isooctane or cyclohexane, is recommended. This zero value remains valid until the method is exited.		

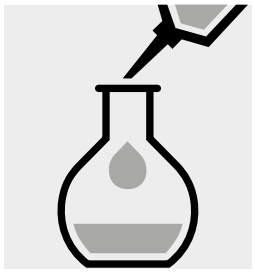
(Melt, if necessary) the sample and homogenize.



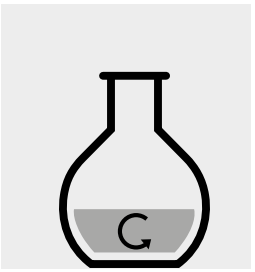
If contaminations are present, filter the sample over a fast filtering paper.



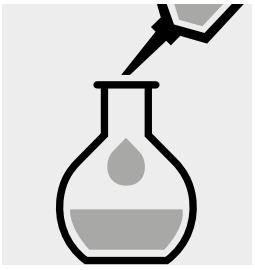
Weigh the sample into a volumetric flask, accurately weighed to 1 mg.



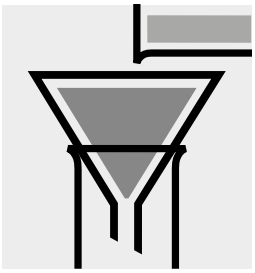
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) or **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822).



Dissolve the sample at room temperature.

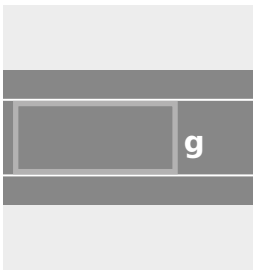


Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) or **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822) and mix.



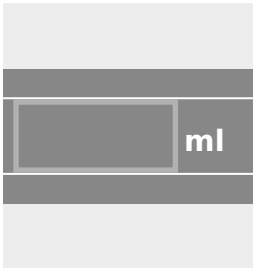
Filter turbid solutions over a paper filter.

Select method no. **2525**. Perform the zero adjustment and confirm by pressing the <OK> button.

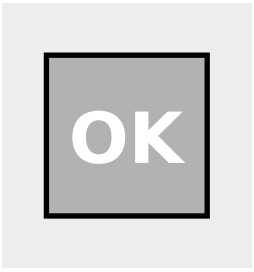


Enter the sample weight in grams.

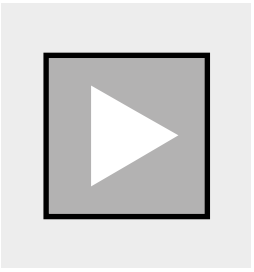
Confirm with <OK>.



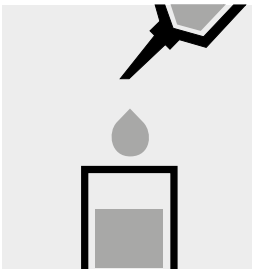
Enter the volume of the sample solution in milliliters.



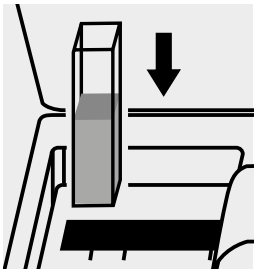
Confirm with <OK>.



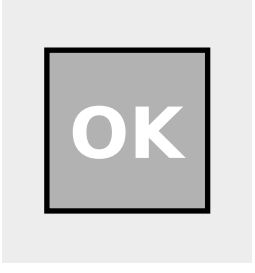
Tap the <Start> button.



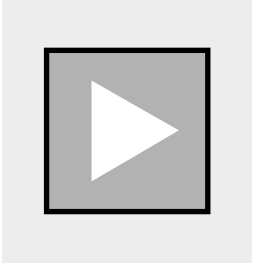
Transfer the solution into the quartz cell.



Place the cell into the cell compartment. The measurement is performed automatically.



Confirm with <OK>. The K_{232} value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample. The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

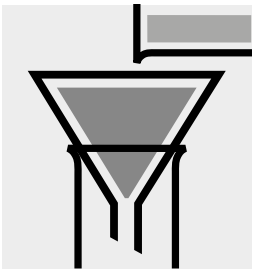
$K_{268\ nm}$ of olive oil

corresponds to **Commission Regulation (EEC) No 2568/91 Annex IX**

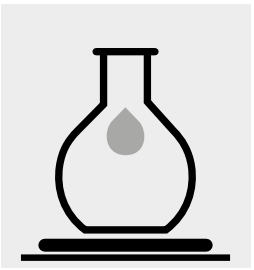
Application

Measuring range:	0 – 4.00 K_{268}	10-mm quartz cell	Method No. 2526
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from isooctane, is recommended. This zero value remains valid until the method is exited.		

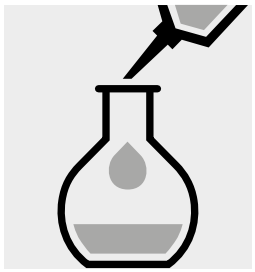
(Melt, if necessary) the sample and homogenize.



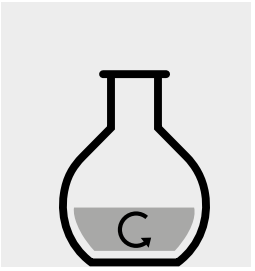
If contaminations are present, filter the sample over a fast filtering paper.



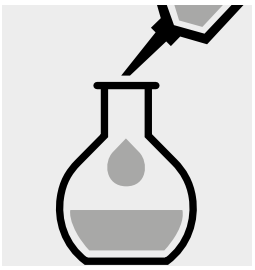
Weigh the sample into a volumetric flask, accurately weighed to 1 mg.



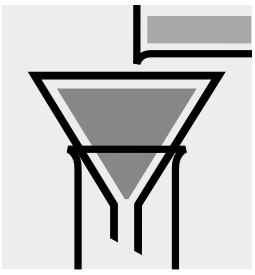
Add a few milliliters of **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718).



Dissolve the sample at room temperature.



Make up the contents of the volumetric flask to the mark with **isooctane for spectroscopy Uvasol®** (Cat. No. 1.04718) and mix.

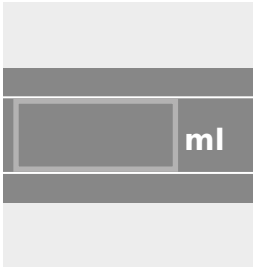


Filter turbid solutions over a paper filter.

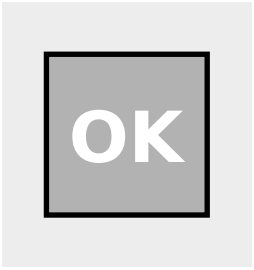
Select method no. **2526**. Perform the zero adjustment and confirm by pressing the <OK> button.

Enter the sample weight in grams.

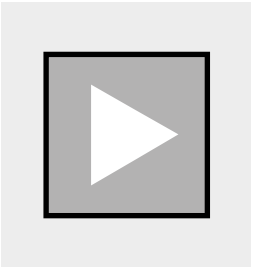
Confirm with <OK>.



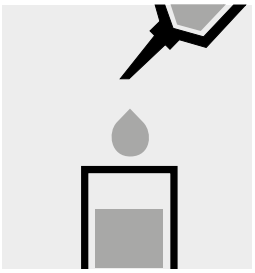
Enter the volume of the sample solution in milliliters.



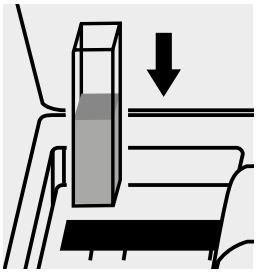
Confirm with <OK>.



Tap the <Start> button.



Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The K_{268} value is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

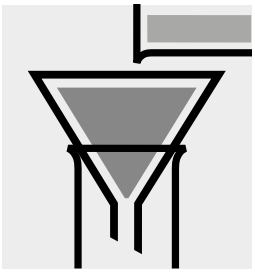
K_{270} nm of olive oil

corresponds to **Commission Regulation (EEC) No 2568/91 Annex IX**

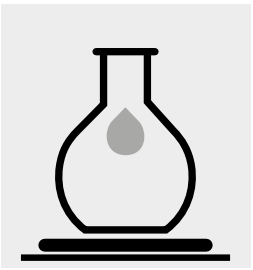
Application

Measuring range:	0 – 4.00 K_{270}	10-mm quartz cell	Method No. 2527
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from cyclohexane, is recommended. This zero value remains valid until the method is exited.		

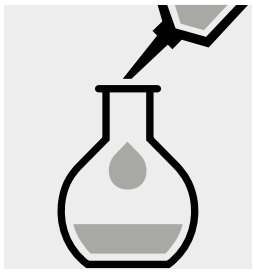
(Melt, if necessary) the sample and homogenize.



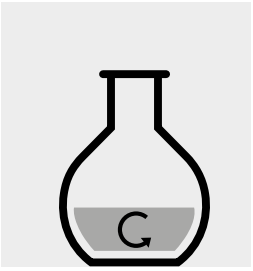
If contaminations are present, filter the sample over a fast filtering paper.



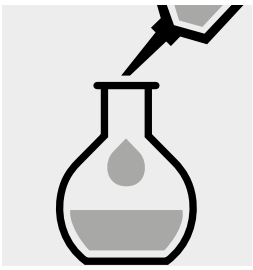
Weigh the sample into a volumetric flask, accurately weighed to 1 mg.



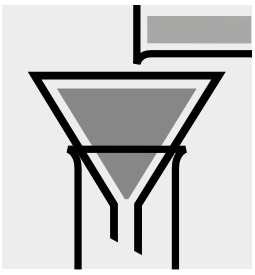
Add a few milliliters of **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822).



Dissolve the sample at room temperature.



Make up the contents of the volumetric flask to the mark with **cyclohexane for spectroscopy Uvasol®** (Cat. No. 1.02822) and mix.



Filter turbid solutions over a paper filter.

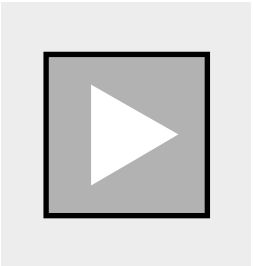
Select method no. **2527**. Perform the zero adjustment and confirm by pressing the <OK> button.

Enter the sample weight in grams.

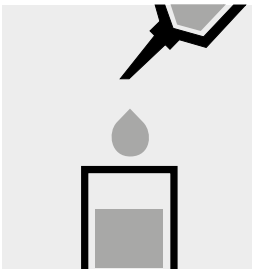
Confirm with <OK>.

Enter the volume of the sample solution in milliliters.

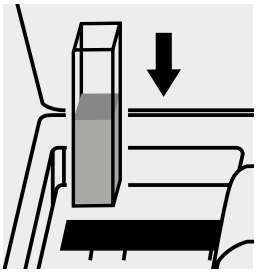
Confirm with <OK>.



Tap the <Start> button.

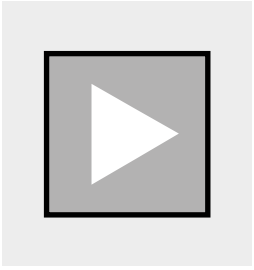


Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The K_{270} value is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

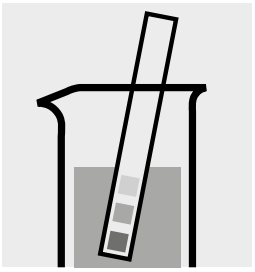
Lead

1.14833

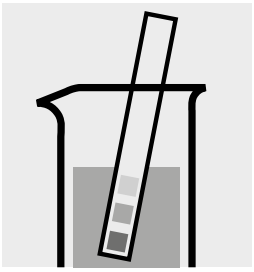
Cell Test

Measuring range:	0.10 – 5.00 mg/l Pb Expression of results also possible in mmol/l.

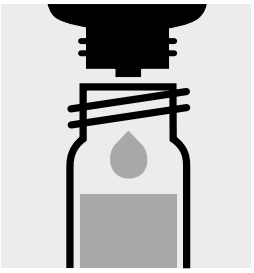
Samples of total hardness 0 –10 °d



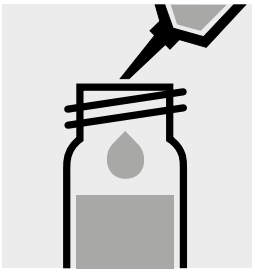
Check the total hardness of the sample.



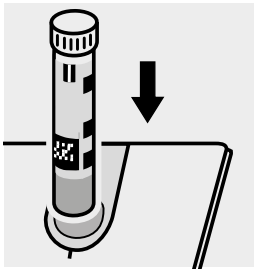
Check the pH of the sample, specified range: pH 3 – 6.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



Add 5 drops of **Pb-1K** into a reaction cell and mix.

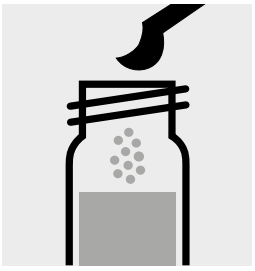


Add 5.0 ml of the sample with pipette, close the cell with the screw cap, and mix.

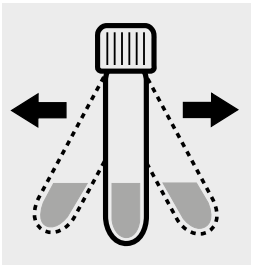


Place the cell into the cell compartment. Align the mark on the cell with that on the photometer
= Result A

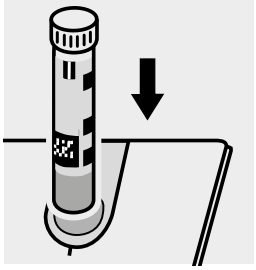
Samples of total hardness >10 °d



Add 1 level grey micro-spoon of **Pb-2K** to the already measured cell, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer
= Result B

Result A
– Result B
= mg/l Pb

Important:

For the determination of **total lead** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of lead (Σ Pb).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701.

Ready-to-use lead standard solution Certipur®, Cat.No. 1.19776, concentration 1000 mg/l Pb, can also be used after diluting accordingly.

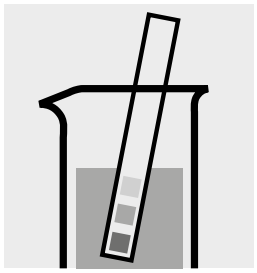
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Lead

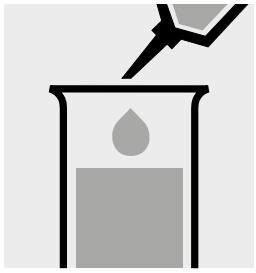
1.09717

Test

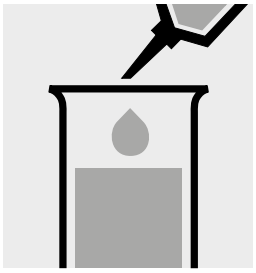
Measuring range:	0.10 – 5.00 mg/l Pb	10-mm cell
	0.05 – 2.50 mg/l Pb	20-mm cell
	0.010 – 1.000 mg/l Pb	50-mm cell
	Expression of results also possible in mmol/l.	



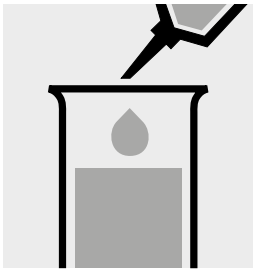
Check the pH of the sample, specified range: pH 3 – 6.
If required, add dilute ammonia solution or nitric acid drop by drop to adjust the pH.



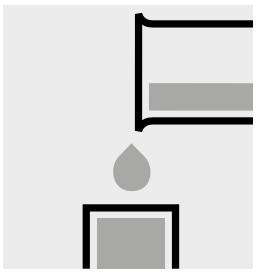
Pipette 0.50 ml of **Pb-1** into a test tube.



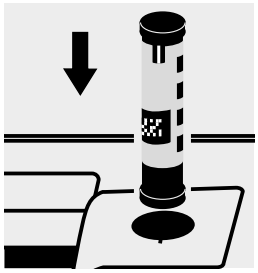
Add 0.50 ml of **Pb-2** with pipette and mix.



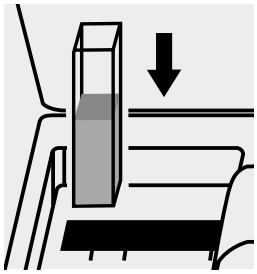
Add 8.0 ml of the sample with pipette and mix.



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total lead** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of lead (Σ Pb).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701 or the Standard solutions for photometric applications, Cat.Nos. 1.33003 and 1.33004.

Ready-to-use lead standard solution Certipur®, Cat.No. 1.19776, concentration 1000 mg/l Pb, can also be used after diluting accordingly.

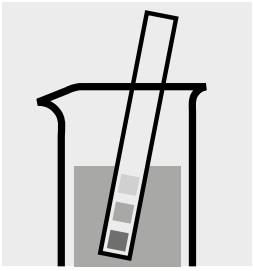
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Magnesium

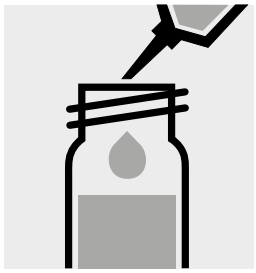
1.00815

Cell Test

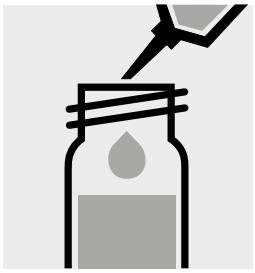
Measuring range:	5.0 – 75.0 mg/l Mg Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

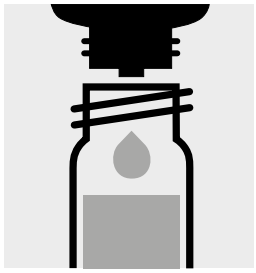


Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

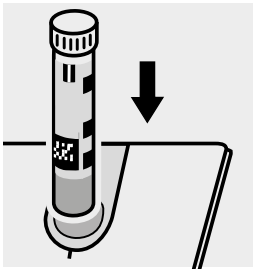


Add 1.0 ml of **Mg-1K** with pipette, close the cell with the screw cap, and mix.

Reaction time:
exactly 3 minutes



Add 3 drops of **Mg-2K**, close the cell with the screw cap and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

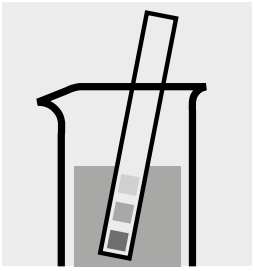
To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Manganese

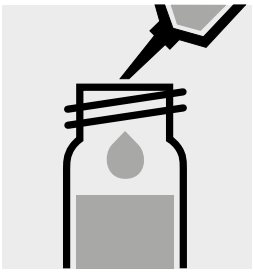
1.00816

Cell Test

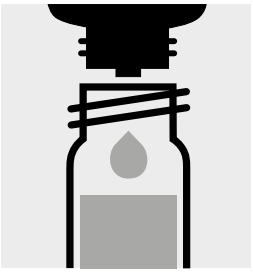
Measuring range:	0.10 – 5.00 mg/l Mn Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 2 – 7.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

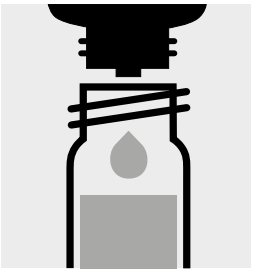


Pipette 7.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



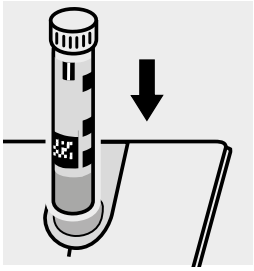
Add 2 drops of **Mn-1K**, close the cell with the screw cap, and mix.

Reaction time:
2 minutes



Add 3 drops of **Mn-2K**, close the cell with the screw cap, and mix.

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.32238 and 1.32239.

Ready-to-use manganese standard solution Certipur®, Cat.No. 1.19789, concentration 1000 mg/l Mn, can also be used after diluting accordingly.

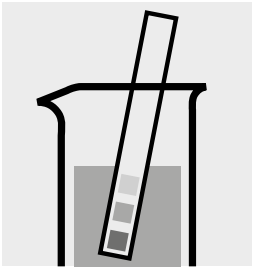
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Manganese

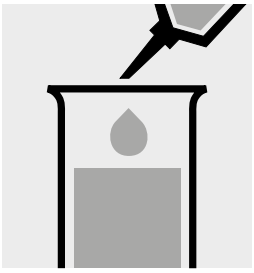
1.14770

Test

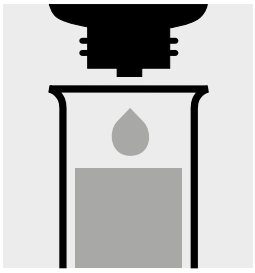
Measuring range:	0.50 – 10.00 mg/l Mn	10-mm cell
	0.25 – 5.00 mg/l Mn	20-mm cell
	0.010 – 2.000 mg/l Mn	50-mm cell
	Expression of results also possible in mmol/l.	



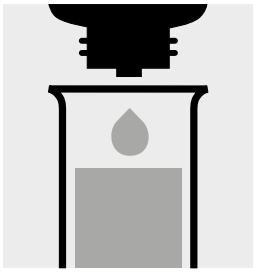
Check the pH of the sample, specified range: pH 2 – 7.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

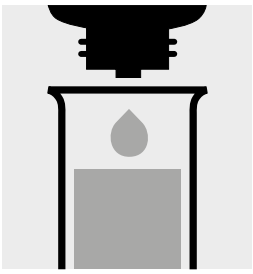


Add 4 drops of **Mn-1** and mix.
Check the pH, specified pH: approx. 11.5.

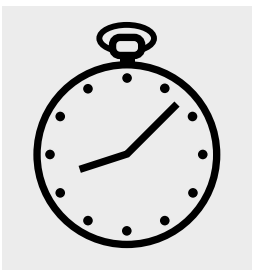


Add 2 drops of **Mn-2** and mix.

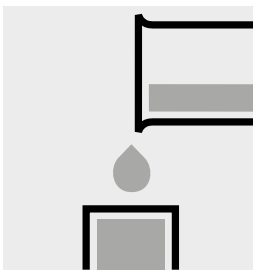
Reaction time: 2 minutes



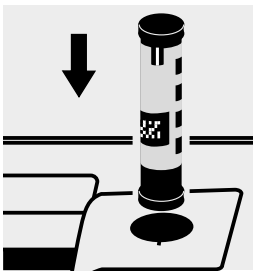
Add 2 drops of **Mn-3** and mix.



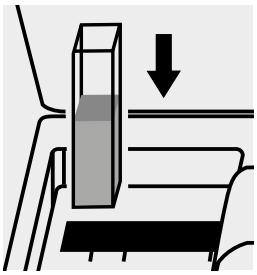
Reaction time: 10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.32237, 1.32238 and 1.32239.

Ready-to-use manganese standard solution Certipur®, Cat.No. 1.19789, concentration 1000 mg/l Mn, can also be used after diluting accordingly.

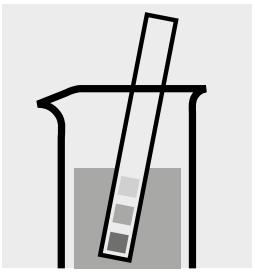
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

Manganese

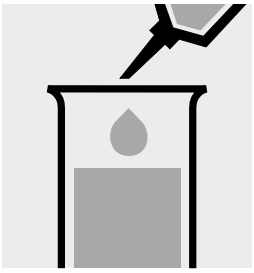
1.01846

Test

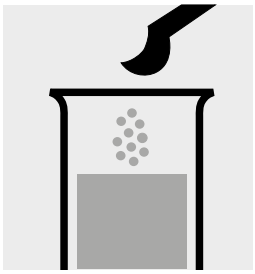
Measuring	0.05 – 2.00	mg/l Mn	10-mm cell
range:	0.03 – 1.00	mg/l Mn	20-mm cell
	0.005 – 0.400	mg/l Mn	50-mm cell
	Expression of results also possible in mmol/l.		



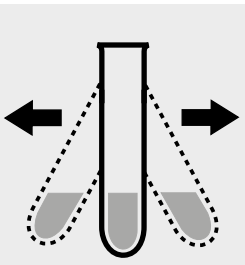
Check the pH of the sample, specified range: pH 3 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



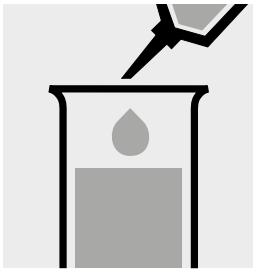
Pipette 8.0 ml of the sample into a test tube.



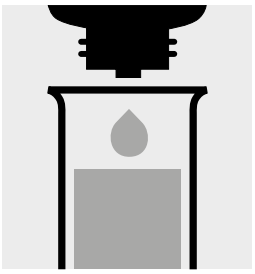
Add 1 level grey micro-spoon of **Mn-1**.



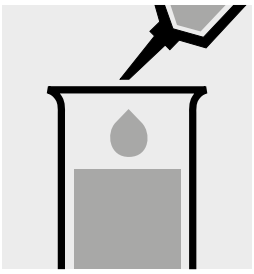
Shake the tube vigor-ously to dissolve the sol-id substance.



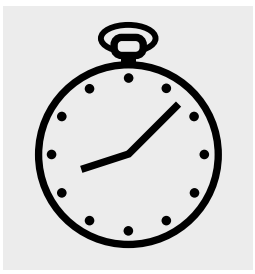
Add 2.0 ml of **Mn-2** with pipette and mix.



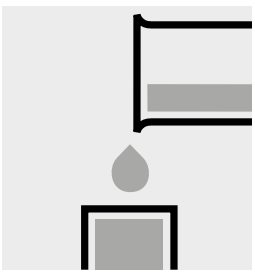
Add **carefully** 3 drops of **Mn-3** and mix.



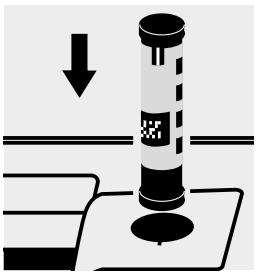
Add **carefully** 0.25 ml of **Mn-4** with pipette and mix **carefully** (**Foams! Wear eye protection!**).



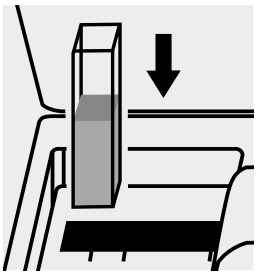
Reaction time:
10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

When using the 50-mm cell, perform the measurement against a separately prepared blank (preparation as per measurement sample, but with distilled water instead of sample).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 90, Cat.No. 1.18700 or the Standard solutions for photometric applications, Cat.Nos. 1.32237, 1.32238 and 1.32239.

Ready-to-use manganese standard solution Certipur®, Cat.No. 1.19789, concentration 1000 mg/l Mn, can also be used after diluting accordingly.

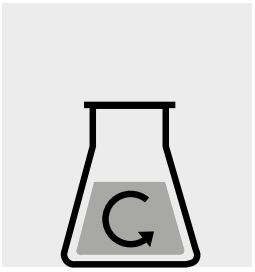
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 90) is highly recommended.

McFarland

Determination of microbial cell concentration in suspensions

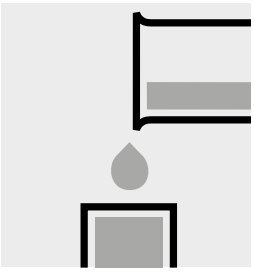
Application

Measuring	0.0 – 10.0	McFarland	10-mm cell	Method No. 2513
range:	0 – 3000	CFU (x 10^6/ml) based on E. *coli*	10-mm cell	Method No. 2513
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This zero value remains valid until the method is exited.			

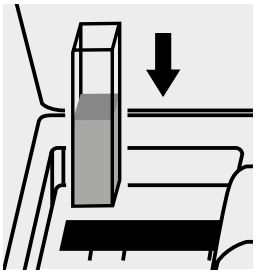


Homogenize the sample **carefully**: measurement sample.

Select method no. **2513**. Perform the zero adjustment and confirm by pressing the <OK> button.

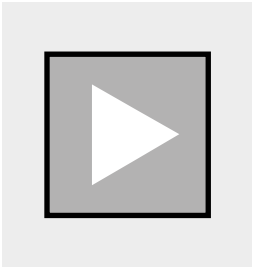


Transfer the **measurement sample** into the cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Confirm with <OK>. The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

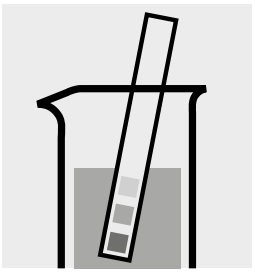
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

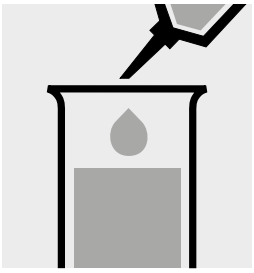
Mercury in water and wastewater

Application

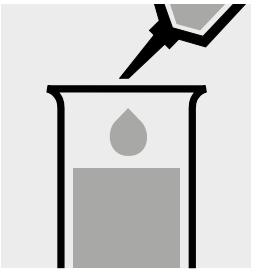
Measuring range: 0.025 – 1.000 mg/l Hg 50-mm cell Method No. 135



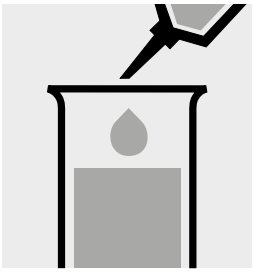
Check the pH of the sample, specified range: pH 3 – 7.
If required, add dilute sodium hydroxide solution or acetic acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

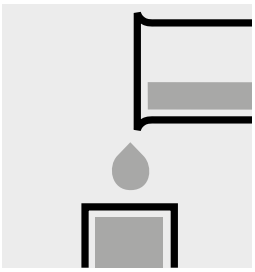


Add 1.0 ml of **reagent 1** with pipette and mix.



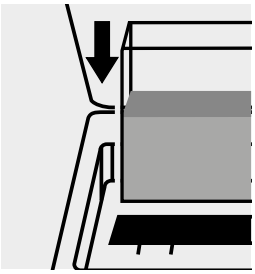
Add 1.5 ml of **reagent 2** with pipette and mix.

Reaction time: 5 minutes



Transfer the solution into a cell.

Select method no. **135**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

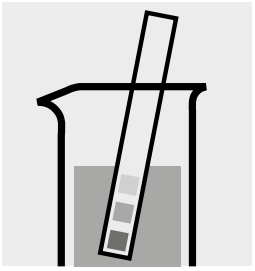
The exact composition and preparation of the reagents 1 and 2 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

Molybdenum

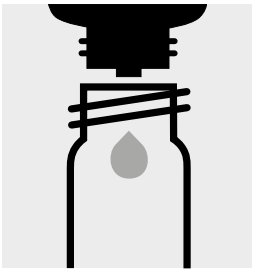
1.00860

Cell Test

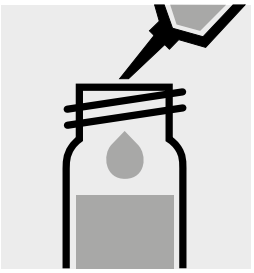
Measuring range:	0.02 – 1.00 mg/l Mo
	0.03 – 1.67 mg/l MoO_4
	0.04 – 2.15 mg/l Na_2MoO_4
	Expression of results also possible in mmol/l.



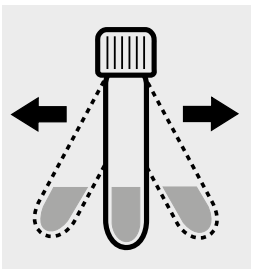
Check the pH of the sample, specified range: pH 1 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Place 2 drops of **Mo-1K** into a reaction cell and mix.

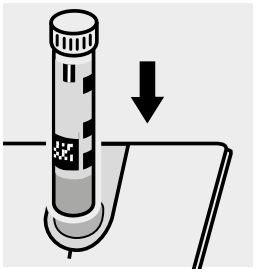


Add 10 ml of the sample with pipette, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 2 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

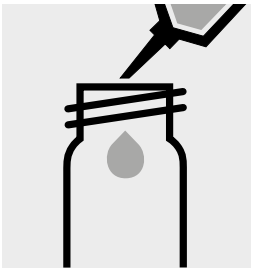
To check the measurement system (test reagents, measurement device, and handling) a ready-to-use molybdenum standard solution Certipur®, Cat.No. 1.70227, concentration 1000 mg/l Mo, can be used after diluting accordingly.

Molybdenum

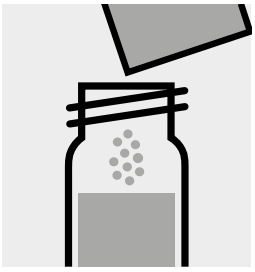
1.19252

Test

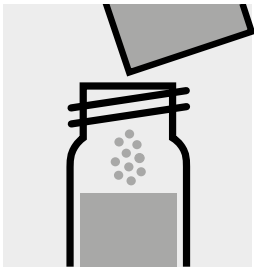
Measuring range:	0.5 – 45.0 mg/l Mo	20-mm cell
	0.8 – 75.0 mg/l MoO_4	20-mm cell
	1.1 – 96.6 mg/l Na_2MoO_4	20-mm cell
	Expression of results also possible in mmol/l.	



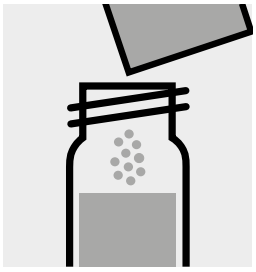
Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).



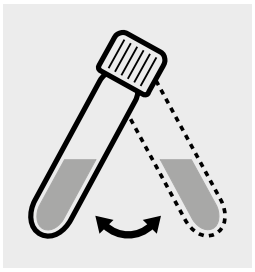
Add 1 powder pack of **Molybdenum HR1**, close with the screw cap, and dissolve the solid substance.



Add 1 powder pack of **Molybdenum HR2**, close with the screw cap, and dissolve the solid substance.

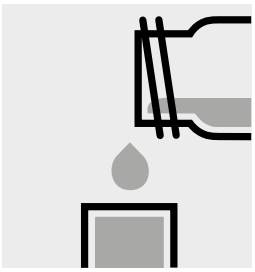


Add 1 powder pack of **Molybdenum HR3** and close with the screw cap.

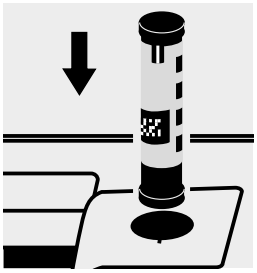


Swirl the cell to dissolve the solid substance.

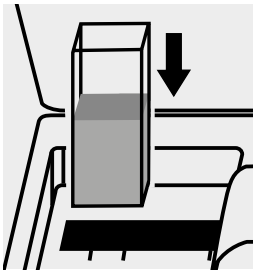
Reaction time: 5 minutes, **measure immediately**.



Transfer the solution into a rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

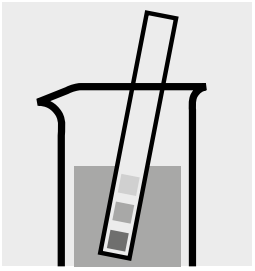
To check the measurement system (test reagents, measurement device, and handling) a ready-to-use molybdenum standard solution Certipur®, Cat.No. 1.70227, concentration 1000 mg/l Mo, can be used after diluting accordingly.

Monochloramine

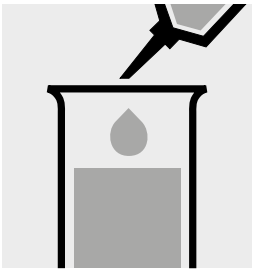
1.01632

Test

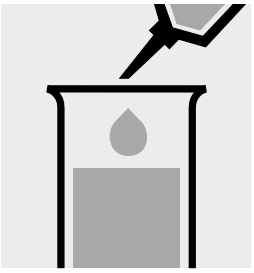
Measuring	0.25 – 10.00 mg/l Cl_2	0.18 – 7.26 mg/l NH_2Cl	0.05 – 1.98 mg/l NH_2Cl-N	10-mm cell
range:	0.13 – 5.00 mg/l Cl_2	0.09 – 3.63 mg/l NH_2Cl	0.026 – 0.988 mg/l NH_2Cl-N	20-mm cell
	0.050 – 2.000 mg/l Cl_2	0.04 – 1.45 mg/l NH_2Cl	0.010 – 0.395 mg/l NH_2Cl-N	50-mm cell
	Expression of results also possible in mmol/l.			



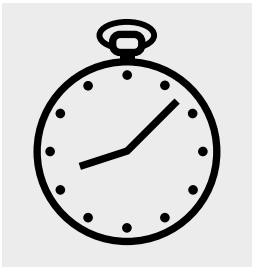
Check the pH of the sample, specified range: pH 4 – 13.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



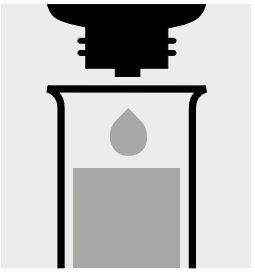
Pipette 10 ml of the sample into a test tube.



Add 0.60 ml of **MCA-1** with pipette and mix.

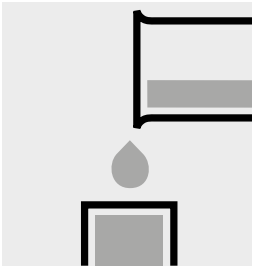


Reaction time:
5 minutes

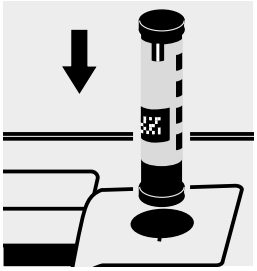


Add 4 drops of **MCA-2** and mix.

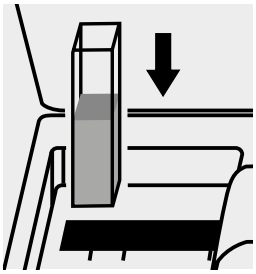
Reaction time:
10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high monochloramine concentrations in the sample produce turquoise-colored solutions (measurement solution should be yellow-green to green) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

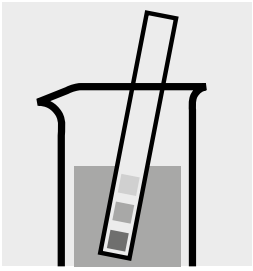
To check the measurement system (test reagents, measurement device, and handling) a standard solution must be prepared (see section "Standard solutions").

Nickel

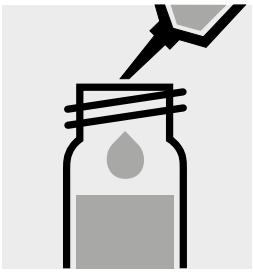
1.14554

Cell Test

Measuring range:	0.10 – 6.00 mg/l Ni Expression of results also possible in mmol/l.

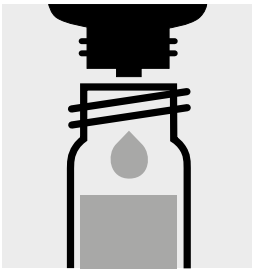


Check the pH of the sample, specified range: pH 3– 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

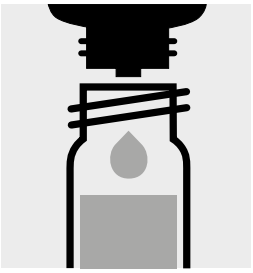


Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Reaction time:
1 minute

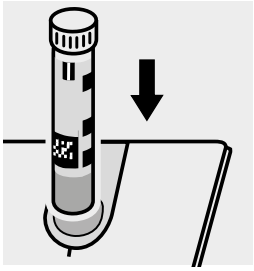


Add 2 drops of **Ni-1K**, close with the screw cap, and mix.



Add 2 drops of **Ni-2K**, close the cell with the screw cap, and mix.

Reaction time:
2 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total nickel** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of nickel (Σ Ni).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701.

A nickel standard solution Titrisol®, Cat.No. 1.09989, can also be used after diluting accordingly.

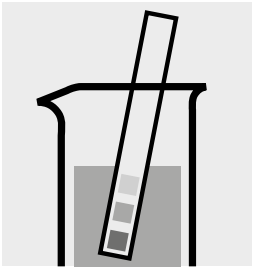
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Nickel

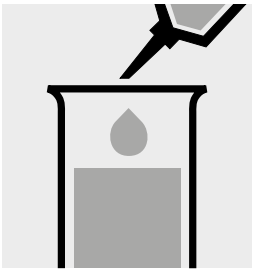
1.14785

Test

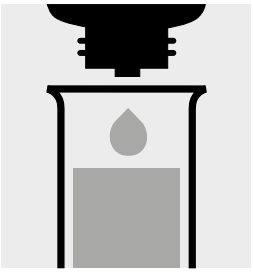
Measuring	0.10 – 5.00 mg/l Ni	10-mm cell
range:	0.05 – 2.50 mg/l Ni	20-mm cell
	0.02 – 1.00 mg/l Ni	50-mm cell
	Expression of results also possible in mmol/l.	



Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

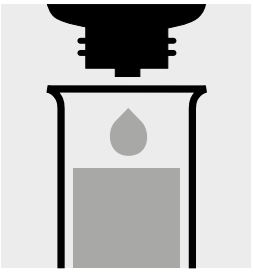


Pipette 5.0 ml of the sample into a test tube.

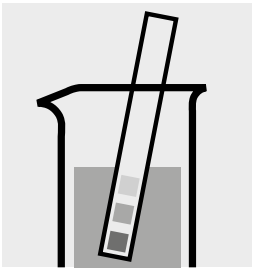


Add 1 drop of **Ni-1** and mix. If the color disappears, continue adding drop by drop until a slight yellow coloration persists.

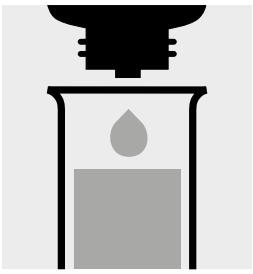
Reaction time:
1 minute



Add 2 drops of **Ni-2** and mix.

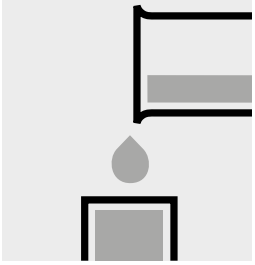


Check the pH, specified range: pH 10 – 12.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

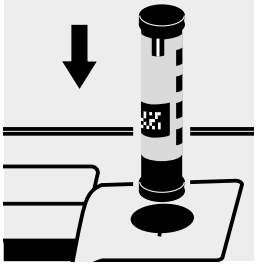


Add 2 drops of **Ni-3** and mix.

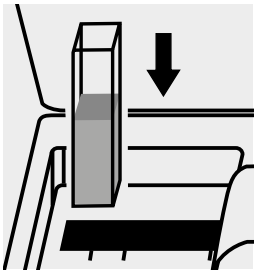
Reaction time:
2 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total nickel** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687 and thermoreactor is necessary.

Result can be expressed as sum of nickel (Σ Ni).

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701.

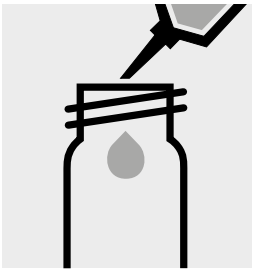
A nickel standard solution Titrisol®, Cat.No. 1.09989, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

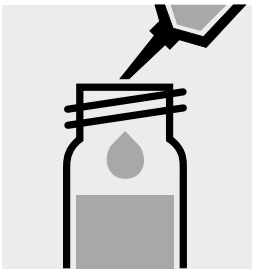
Nickel in electroplating baths

Inherent color

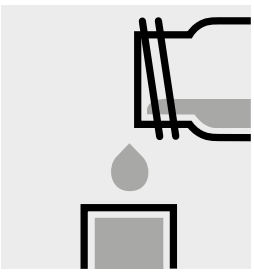
Measuring	10 – 120 g/l Ni	10-mm cell	Method No. 57
range:	5.0 – 60.0 g/l Ni	20-mm cell	Method No. 57
	2.0 – 24.0 g/l Ni	50-mm cell	Method No. 57



Pipette 5.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

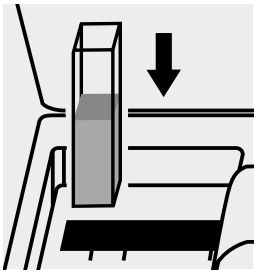


Add 5.0 ml of **sulfuric acid 40 %**, close the cell with the screw cap, and mix.



Transfer the solution into a corresponding cell.

Select method no. **57**.



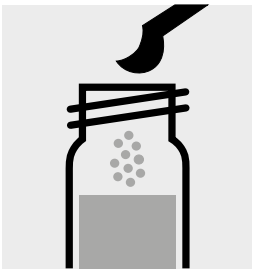
Place the cell into the cell compartment.
The measurement is performed automatically.

Nitrate

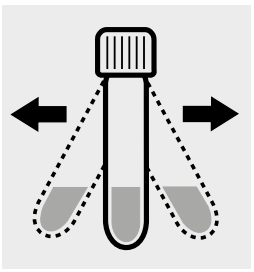
1.14542

Cell Test

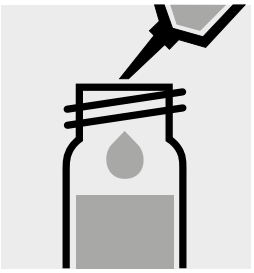
Measuring range:	0.5 – 18.0 mg/l NO_3-N
	2.2 – 79.7 mg/l NO_3
	Expression of results also possible in mmol/l.



Add 1 level microspoon of **NO_3-1K** into a reaction cell and close with the screw cap.

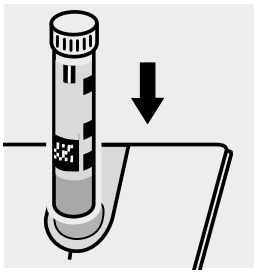


Shake the cell **vigorously for 1 minute** to dissolve the solid substance.



Add very slowly 1.5 ml of the sample with pipette, close the cell with the screw cap, and mix **briefly**.
Caution, cell becomes hot!

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25037, 1.25038, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

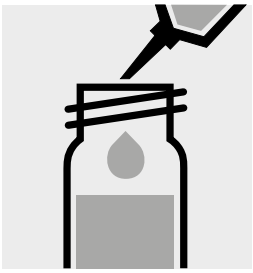
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

Nitrate

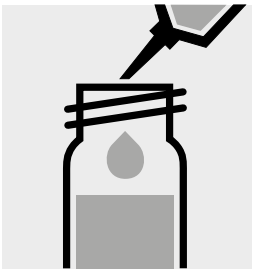
1.14563

Cell Test

Measuring range:	0.5 – 25.0 mg/l NO_3-N
	2.2 – 110.7 mg/l NO_3
	Expression of results also possible in mmol/l.

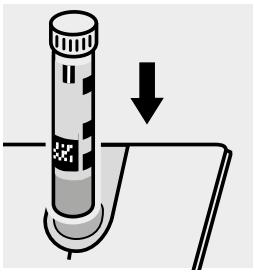


Pipette 1.0 ml of the sample into a reaction cell, **do not mix**.



Add 1.0 ml of **NO_3-1K** with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25037, 1.25038, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

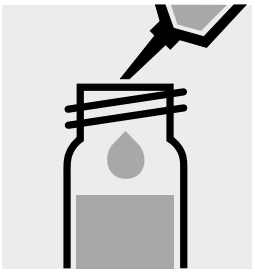
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

Nitrate

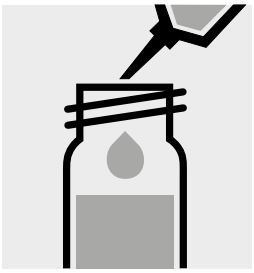
1.14764

Cell Test

Measuring range:	1.0 – 50.0 mg/l NO_3-N 4 – 221 mg/l NO_3 Expression of results also possible in mmol/l.

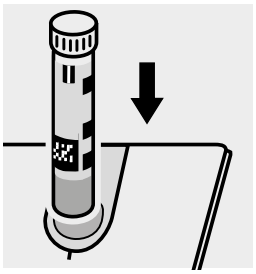


Pipette 0.50 ml of the sample into a reaction cell, **do not mix**.



Add 1.0 ml of **NO_3-1K** with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 80, Cat.No. 1.14738, or the Standard solutions for photometric applications, Cat.Nos. 1.25037, 1.25038, 1.25039, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

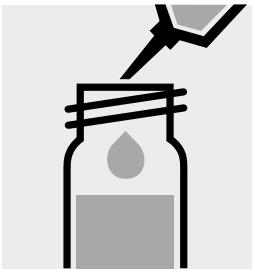
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 80) is highly recommended.

Nitrate

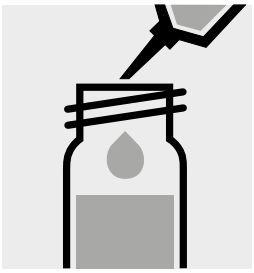
1.00614

Cell Test

Measuring range:	23 – 225 mg/l NO_3-N
	102 – 996 mg/l NO_3
	Expression of results also possible in mmol/l.

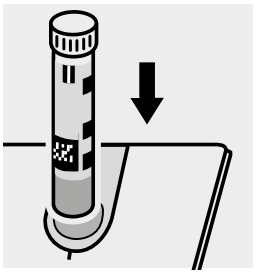


Pipette 1.0 ml of **NO_3-1K** into a reaction cell, **do not mix**.



Add 0.10 ml of the sample with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time: 5 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.25039 and 1.25040.

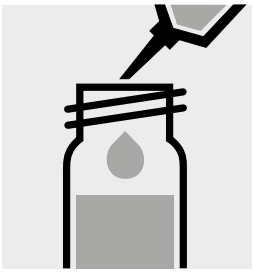
Nitrate

1.14773

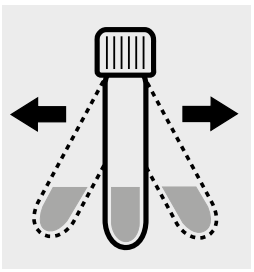
Test

Measuring	0.5 – 20.0	mg/l NO_3-N	2.2 – 88.5	mg/l NO_3	10-mm cell
range:	0.20 – 10.00	mg/l NO_3-N	0.89 – 44.27	mg/l NO_3	20-mm cell
	Expression of results also possible in mmol/l.				

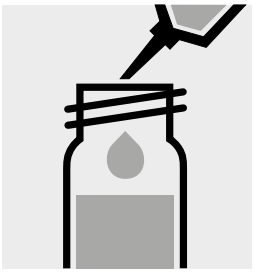
Place 1 microspoon of **NO_3-1** into a dry empty round cell (Empty cells, Cat.No. 1.14724).



Add 5.0 ml of **NO_3-2** with pipette into the cell. Close the cell with the screw cap.

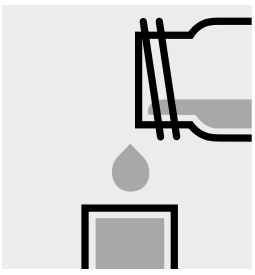


Shake vigorously for 1 minute to dissolve the solid substance.

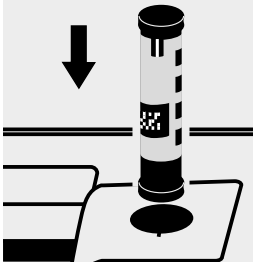


Add very slowly 1.5 ml of the sample with pipette, close the cell with the screw cap, and mix **briefly**.
Caution, cell becomes hot!

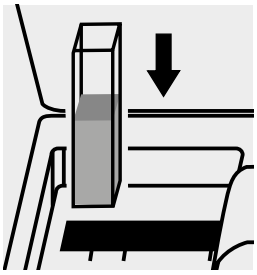
Reaction time: 10 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10 and 20, Cat.Nos. 1.14676 and 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25036, 1.25037, 1.25038, 1.32240, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

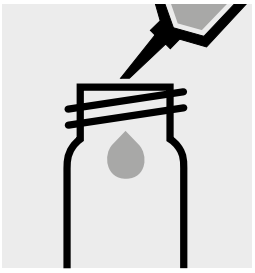
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

Nitrate

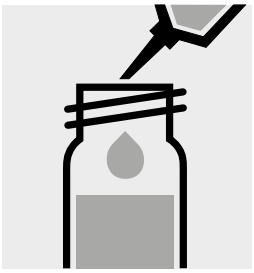
1.09713

Test

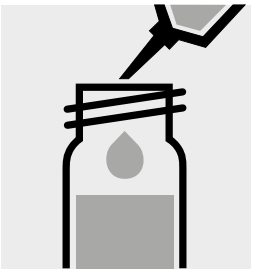
Measuring	1.0 – 25.0 mg/l NO_3-N	4.4 – 110.7 mg/l NO_3	10-mm cell
range:	0.5 – 12.5 mg/l NO_3-N	2.2 – 55.3 mg/l NO_3	20-mm cell
	0.10 – 5.00 mg/l NO_3-N	0.4 – 22.1 mg/l NO_3	50-mm cell
	Expression of results also possible in mmol/l.		



Pipette 4.0 ml of **NO_3-1** into a dry empty round cell (Empty cells, Cat. No. 1.14724).

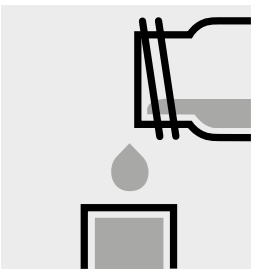


Add 0.50 ml of the sample with pipette, **do not mix.**

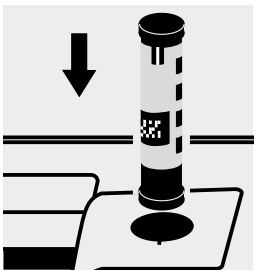


Add 0.50 ml of **NO_3-2** with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

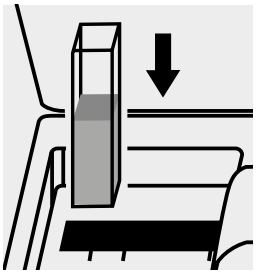
Reaction time: 10 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10 and 20, Cat.Nos. 1.14676 and 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25036, 1.25037, 1.25038, 1.32240, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

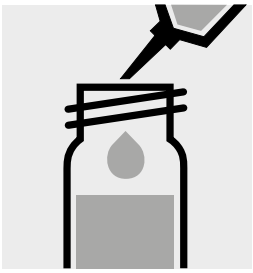
Nitrate

in seawater

1.14556

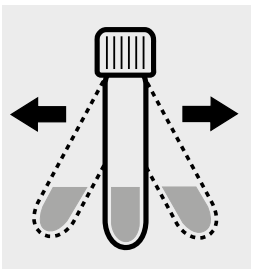
Cell Test

Measuring range:	0.10 – 3.00 mg/l NO_3-N
	0.4 – 13.3 mg/l NO_3
	Expression of results also possible in mmol/l.



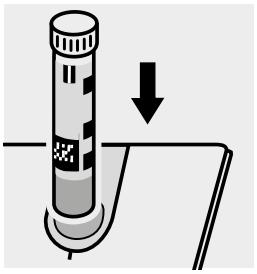
Pipette 2.0 ml of the sample into a reaction cell, **do not mix**.

Add 1 level blue micro-spoon of **NO_3-1K**, **immediately** close the cell tightly with the screw cap. **Caution, foams strongly (eye protection, protective gloves)!**



Shake the cell **vigorously for 5 seconds** to dissolve the solid substance.

Reaction time: 30 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25036, 1.25037, 1.32240, and 1.32241.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

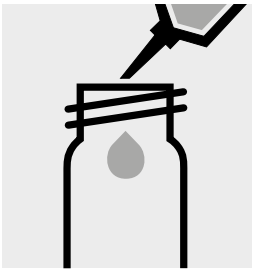
Nitrate

in seawater

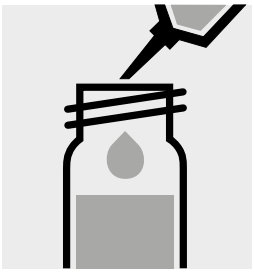
1.14942

Test

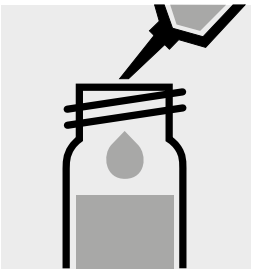
Measuring	0.2 – 17.0 mg/l NO_3-N	0.9 – 75.3 mg/l NO_3	10-mm cell
range:	Expression of results also possible in mmol/l.		



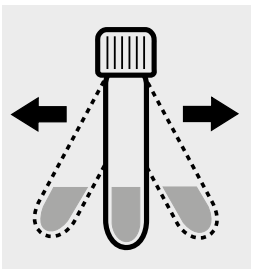
Pipette 5.0 ml of **NO_3-1** into a dry empty round cell (Empty cells, Cat. No. 1.14724).



Add 1.0 ml of the sample with pipette. **Caution, cell becomes hot!**

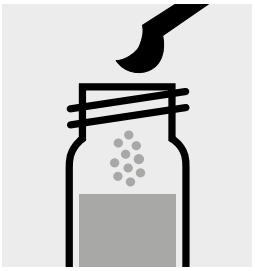


Immediately add 1.5 ml of **NO_3-2** with pipette.

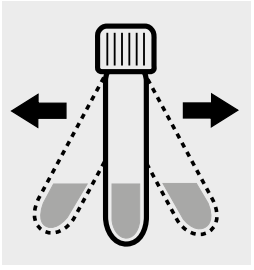


Close cell tightly and shake **vigorously**.

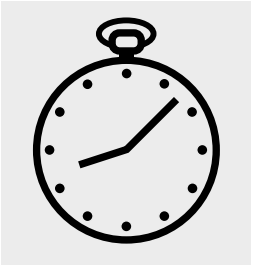
Reaction time: 15 minutes



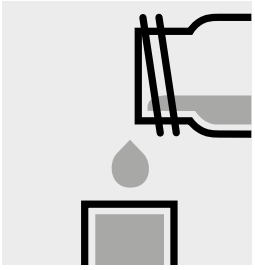
Add 2 level grey micro-spoons of **NO_3-3**.



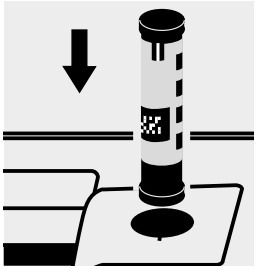
Close cell tightly and shake **vigorously** until the reagent is completely dissolved.



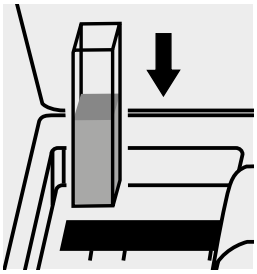
Reaction time: 60 minutes



Transfer the solution into a rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25036, 1.25037, 1.25038, 1.32240, 1.32241, and 1.32242.

Ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can also be used after diluting accordingly.

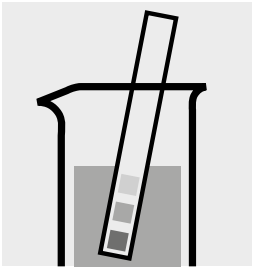
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

Nitrate

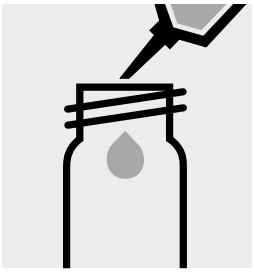
1.01842

Test

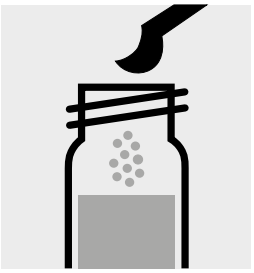
Measuring range:	0.3 – 30.0 mg/l NO_3-N	1.3 – 132.8 mg/l NO_3	50-mm cell
	Expression of results also possible in mmol/l.		



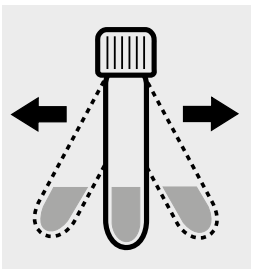
Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



Pipette 10 ml of the sample into a test tube (Flat-bottomed tubes, Cat.No. 1.14902).

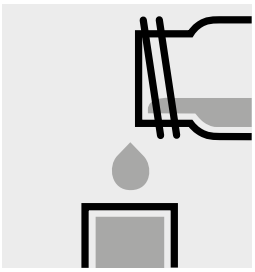


Add 1 level blue micro-spoon of **NO_3-1**, **immediately** close tightly with the screw cap.

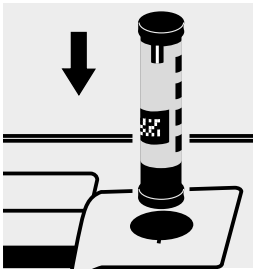


Shake the tube **vigorously for 1 minute** to dissolve the solid substance.

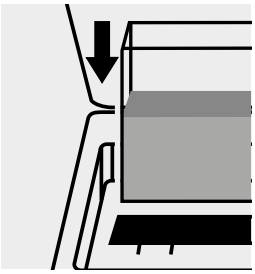
Reaction time:
5 minutes, **measure immediately**.



Transfer the solution (when possible without sediment) into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

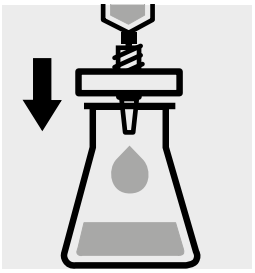
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a ready-to-use nitrate standard solution Certipur®, Cat.No. 1.19811, concentration 1000 mg/l NO_3^-, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32241 and 1.32242.

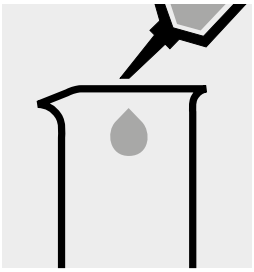
Nitrate
(Direct measurement in the UV range)
analogous to **APHA 4500-NO_3^- B**

Application

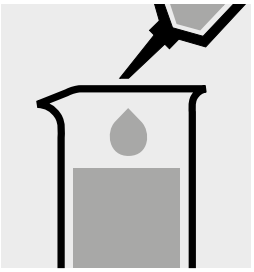
Measuring range: 0.0 – 7.0 mg/l NO_3-N | 10-mm quartz cell | Method No. 2503



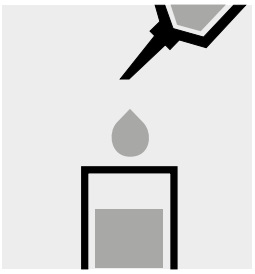
Filter turbid samples.



Place 50 ml of sample into a glass vessel.

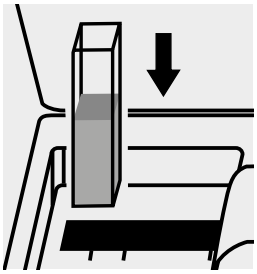


Add 1 ml of **hydrochloric acid 1mol/l Titripur®** (Cat. No. 1.09057) with pipette and mix.



Transfer the solution into the quartz cell.

Select method no. **2503**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

If "Condition not met" appears on the display, this is due to a sample-dependent interference (matrix effect).
In this case an evaluation is not possible.

Important:

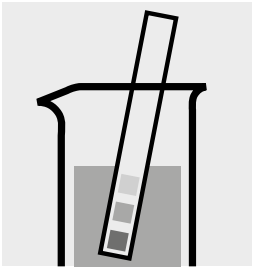
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Nitrite

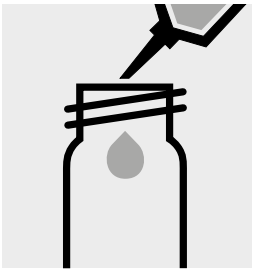
1.14547

Cell Test

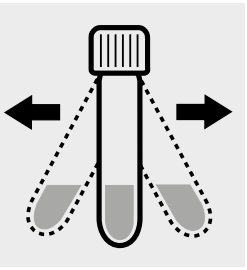
Measuring range:	0.010 – 0.700 mg/l NO_2-N
	0.03 – 2.30 mg/l NO_2
	Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 2 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.

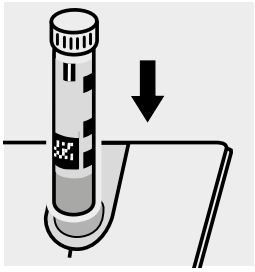


Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time: 10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

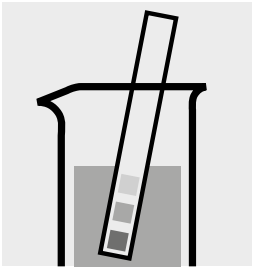
To check the measurement system (test reagents, measurement device, and handling) ready-to-use nitrite standard solution Certipur®, Cat.No. 1.19899, concentration 1000 mg/l NO_2^-, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.25041.

Nitrite

1.00609

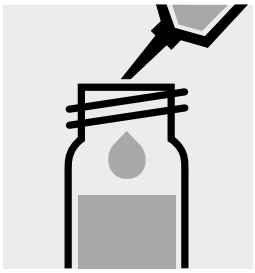
Cell Test

Measuring range:	1.0 – 90.0 mg/l NO_2-N 3 – 296 mg/l NO_2 Expression of results also possible in mmol/l.

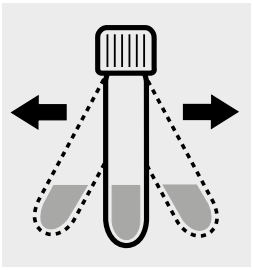


Check the pH of the sample, specified range: pH 1 – 12.
If required, add dilute sulfuric acid drop by drop to adjust the pH.

Add 2 level blue micro-spoons of **NO_2-1K** into a reaction cell.

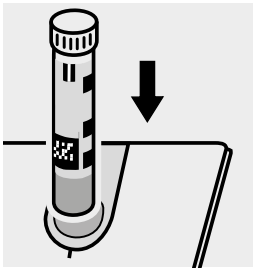


Add 8.0 ml of the sample with pipette and close with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
20 minutes, **measure immediately**.
Do not shake or swirl the cell before the measurement.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

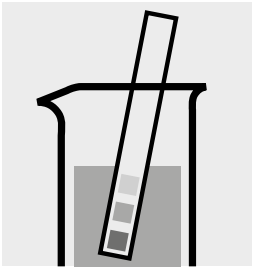
To check the measurement system (test reagents, measurement device, and handling) ready-to-use nitrite standard solution Certipur®, Cat.No. 1.19899, concentration 1000 mg/l NO_2^-, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.25042.

Nitrite

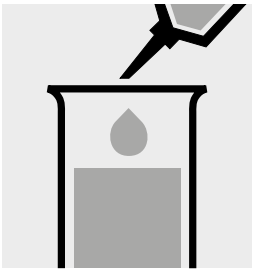
1.14776

Test

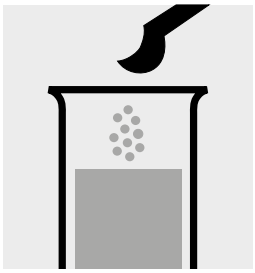
Measuring range:	0.02 – 1.00 mg/l NO_2-N	0.07 – 3.28 mg/l NO_2	10-mm cell
	0.010 – 0.500 mg/l NO_2-N	0.03 – 1.64 mg/l NO_2	20-mm cell
	0.002 – 0.200 mg/l NO_2-N	0.007 – 0.657 mg/l NO_2	50-mm cell
	Expression of results also possible in mmol/l.		



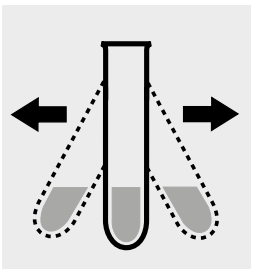
Check the pH of the sample, specified range: pH 2 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



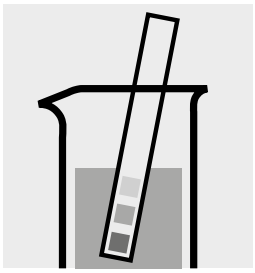
Pipette 5.0 ml of the sample into a test tube.



Add 1 level blue micro-spoon of **NO_2-1**.

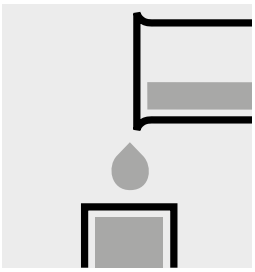


Shake vigorously for 1 minute to dissolve the solid substance.

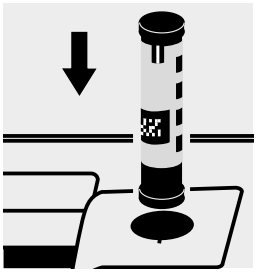


Check the pH, specified range: pH 2.0 – 2.5.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

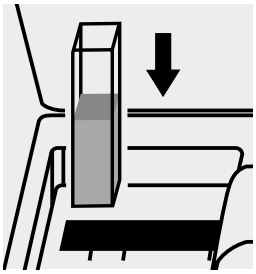
Reaction time:
10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

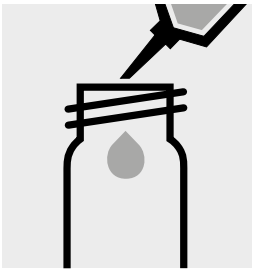
To check the measurement system (test reagents, measurement device, and handling) ready-to-use nitrite standard solution Certipur®, Cat.No. 1.19899, concentration 1000 mg/l NO_2^-, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.25041.

Nitrogen (total)

1.14537

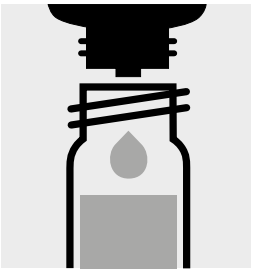
Cell Test

Measuring range:	0.5 – 15.0 mg/l N Expression of results also possible in mmol/l.

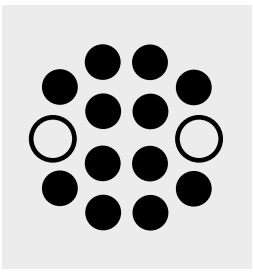


Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

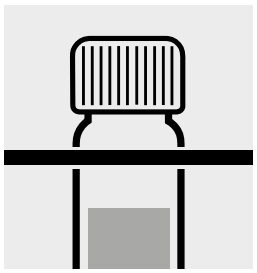
Add 1 level blue micro-spoon of **N-1K.**



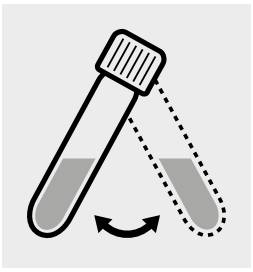
Add 6 drops of **N-2K**, close the cell with the screw cap, and mix.



Heat the cell in the thermoreactor at 120 °C for 1 hour.

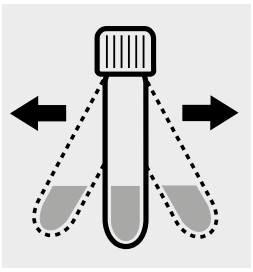


Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature:
pretreated sample.

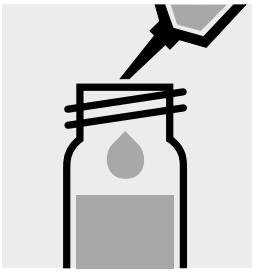


Swirl the cell after 10 minutes.

Add 1 level microspoon of **N-3K into a reaction cell**, close the cell with the screw cap.

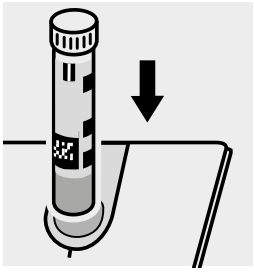


Shake the cell **vigorously for 1 minute** to dissolve the solid substance.



Add very slowly 1.5 ml of the **pretreated sample** with pipette, close the cell with the screw cap, and mix **briefly**.
Caution, cell becomes hot!

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solutions for photometric applications, Cat.Nos. 1.25043 and 1.25044.

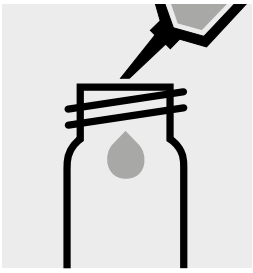
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

Nitrogen (total)

1.00613

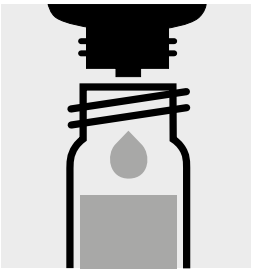
Cell Test

Measuring range:	0.5 – 15.0 mg/l N Expression of results also possible in mmol/l.

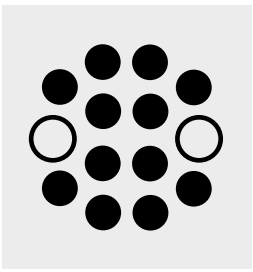


Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

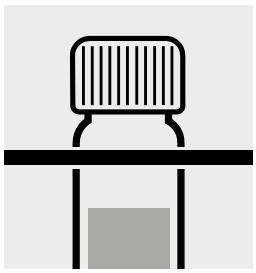
Add 1 level blue micro-spoon of **N-1K.**



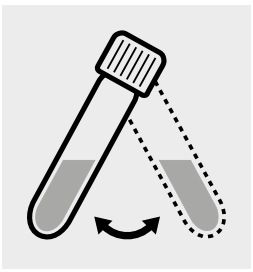
Add 6 drops of **N-2K**, close the cell with the screw cap, and mix.



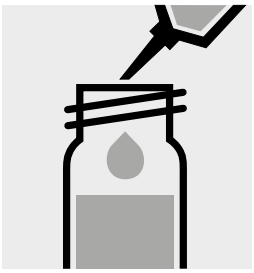
Heat the cell in the thermoreactor at 120 °C for 1 hour.



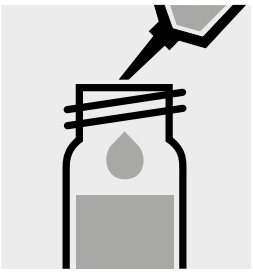
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature:
pretreated sample.



Swirl the cell after 10 minutes.

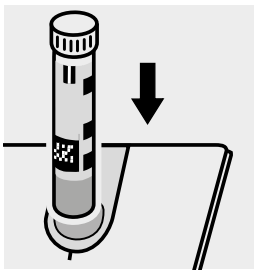


Pipette 1.0 ml of the **pretreated sample** into a reaction cell, **do not mix!**



Add 1.0 ml of **N-3K** with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 50, Cat.No. 1.14695, or the Standard solutions for photometric applications, Cat.Nos. 1.25043 and 1.25044.

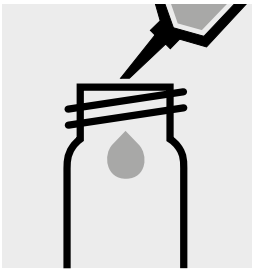
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 50) is highly recommended.

Nitrogen (total)

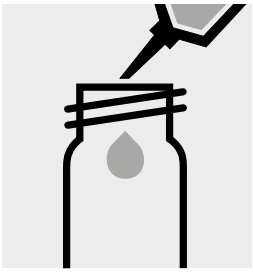
1.14763

Cell Test

Measuring range:	10 – 150 mg/l N Expression of results also possible in mmol/l.

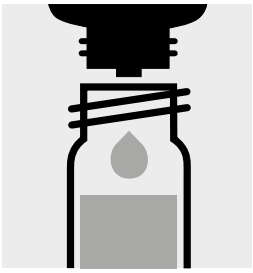


Pipette 1.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

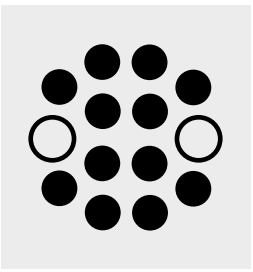


Add 9.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) with pipette.

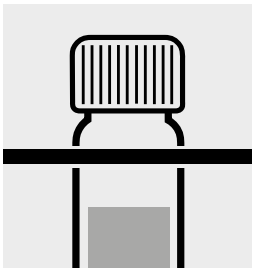
Add 1 level blue microspoon of **N-1K.**



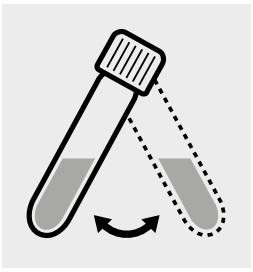
Add 6 drops of **N-2K**, close the cell with the screw cap, and mix.



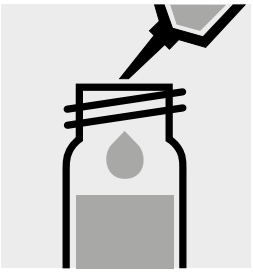
Heat the cell in the thermoreactor at 120 °C for 1 hour.



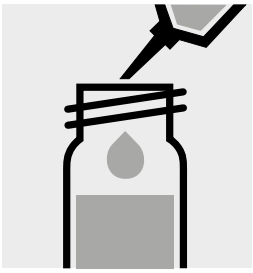
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature:
pretreated sample.



Swirl the cell after 10 minutes.

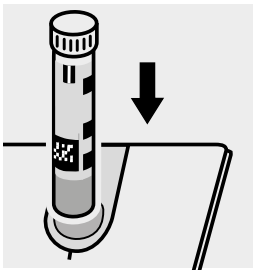


Pipette 1.0 ml of the **pretreated sample** into a reaction cell, **do not mix!**



Add 1.0 ml of **N-3K** with pipette, close the cell with the screw cap, and mix. **Caution, cell becomes hot!**

Reaction time:
10 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 70, Cat.No. 1.14689, or the Standard solutions for photometric applications, Cat.Nos. 1.25044 and 1.25045.

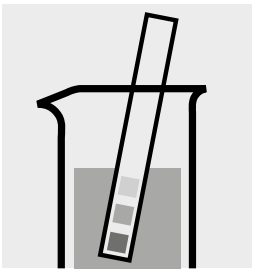
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 70) is highly recommended.

Oxygen

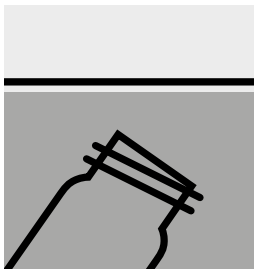
1.14694

Cell Test

Measuring range:	0.5 – 12.0 mg/l O_2 Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 6 – 8.
If required, add dilute sodium hydroxide solution or nitric acid drop by drop to adjust the pH.



Fill watersample into a reaction cell to over-flowing and make sure, that no air bubbles are present.

Place the filled cell in a test-tube rack.

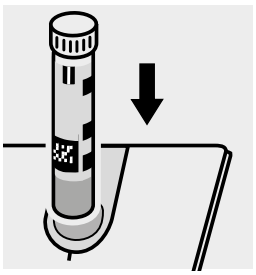
Add with microspoon 1 glass bead.

Add 5 drops of **O_2-1K.**

Add 5 drops of O_2-2K, close the cell with the screw cap, and shake for 10 seconds.

Reaction time:
1 minute

Add 10 drops of **O_2-3K**, close the cell with the screw cap, mix, and clean from outside.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

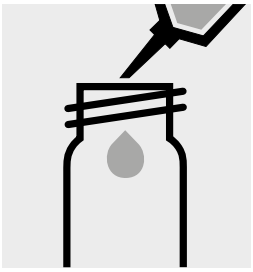
To check the measurement system (test reagents, measurement device, and handling) a oxygen standard solution must be prepared (application see the website).

Oxygen Scavengers

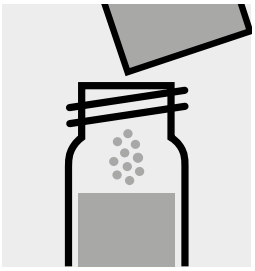
1.19251

Test

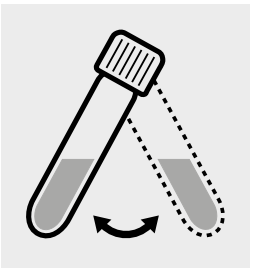
Measuring range:	0.020 – 0.500 mg/l DEHA*	20-mm cell
	*N,N-diethylenhydroxylamine	
	0.027 – 0.666 mg/l Carbohy*	20-mm cell
	*carbohydrazide	
	0.05 – 1.32 mg/l Hydro*	20-mm cell
	*hydroquinone	
	0.08 – 1.95 mg/l ISA*	20-mm cell
	*isoascorbic acid	
	0.09 – 2.17 mg/l MEKO*	20-mm cell
	*methylethylketoxime	



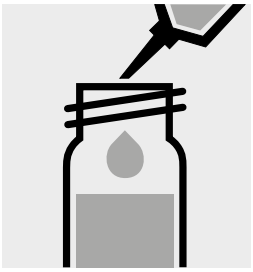
Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).



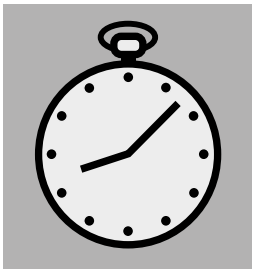
Add 1 powder pack of **Oxyscav 1** and close with the screw cap.



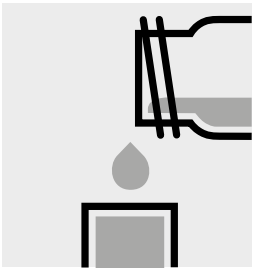
Swirl the cell to dissolve the solid substance.



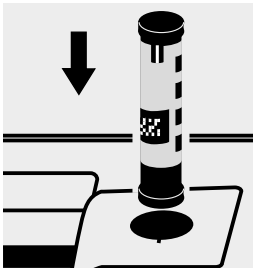
Add 0.20 ml of **Oxyscav 2** with pipette, close with the screw cap, and mix.



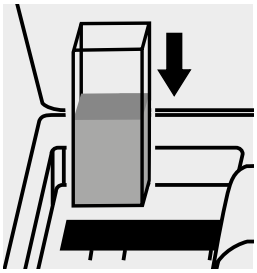
Reaction time: 10 minutes, **protect from light in the process**, **measure immediately**.



Transfer the solution into a rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

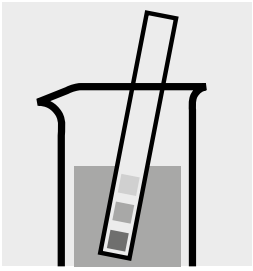
To check the measurement system (test reagents, measurement device, and handling) a oxygen scavengers standard solution must be prepared from N,N-diethylhydroxylamine, Cat.No. 8.18473 (see section "Standard solutions").

Ozone

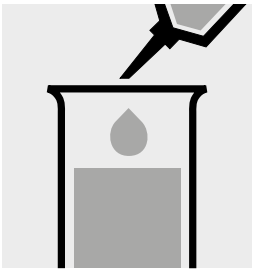
1.00607

Test

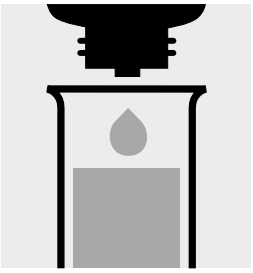
Measuring	0.05 – 4.00	mg/l O_3	10-mm cell
range:	0.02 – 2.00	mg/l O_3	20-mm cell
	0.010 – 0.800	mg/l O_3	50-mm cell
	Expression of results also possible in mmol/l.		



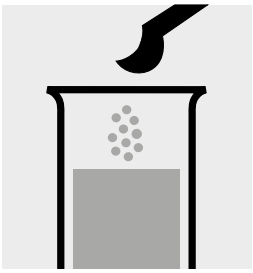
Check the pH of the sample, specified range: pH 4 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



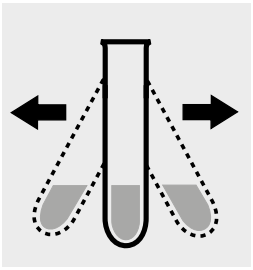
Pipette 10 ml of the sample into a test tube.



Add 2 drops of **O_3-1** and mix.

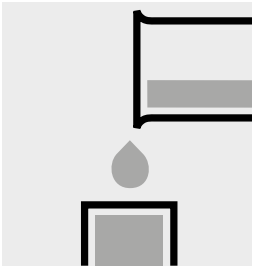


Add 1 level blue micro-spoon of **O_3-2.**

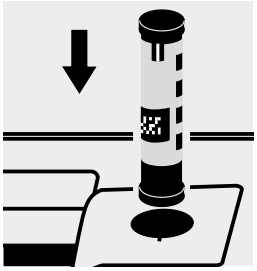


Shake vigorously to dissolve the solid substance.

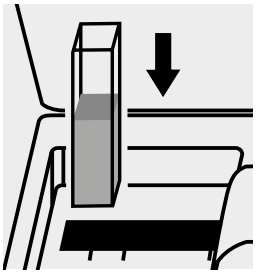
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high ozone concentrations in the sample produce yellow-colored solutions (measurement solution should be red) and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

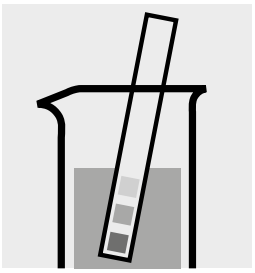
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

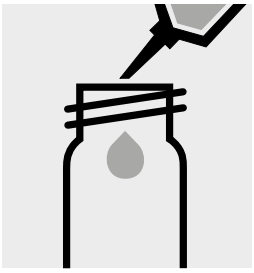
Palladium in water and wastewater

Application

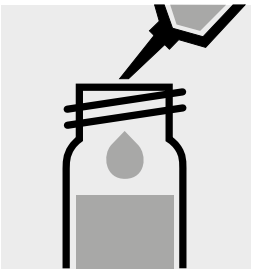
Measuring range: 0.05 – 1.25 mg/l Pd | 10-mm cell | Method No. 133



Check the pH of the sample, specified range: pH 2 – 5.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

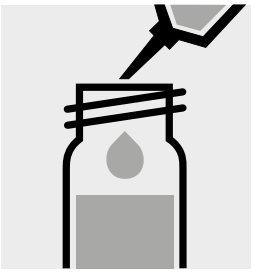


Pipette 5.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

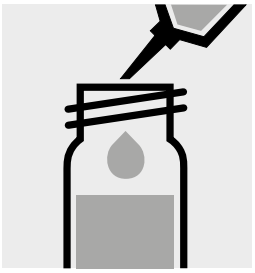


Add 1.0 ml of **reagent 1** with pipette, close the cell with the screw cap, and mix.

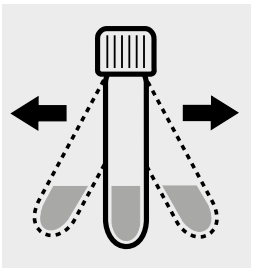
Check the pH of the sample, specified value: pH 3.0.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



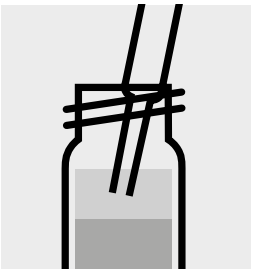
Add 0.20 ml of **reagent 2** with pipette, close the cell with the screw cap, and mix.



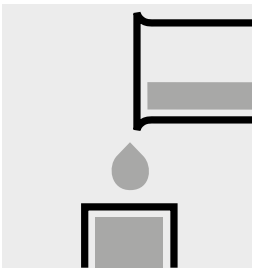
Add 5.0 ml **isoamyl alcohol GR** (Cat.No. 100979) with pipette, close the cell with the screw cap.



Shake the cell vigorously for 1 minute.
Leave to stand to allow phases to separate.

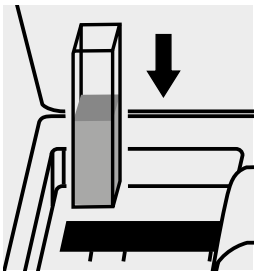


Aspirate the organic-clear upper phase from the tube with pipette and dry over **sodium sulfate anhydrous** (Cat.No. 1.06649).



Transfer the dried solution into a cell.

Select method no. **133**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Important:

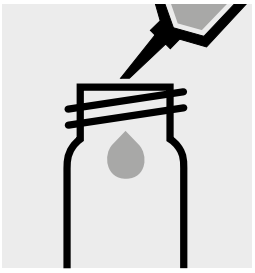
The exact composition and preparation of the reagents 1 and 2 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

pH

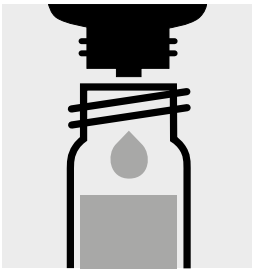
1.01744

Cell Test

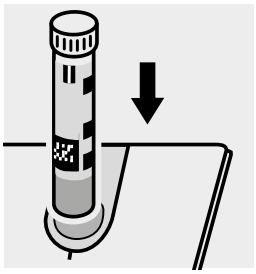
Measuring range: pH 6.4 – 8.8



Pipette 10 ml of the sample into a round cell.



Add 4 drops of **pH-1**, close the cell with the screw cap, and mix.
Attention!
The reagent bottle must be held **vertically by all means!**



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

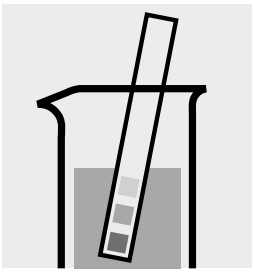
To check the measurement system (test reagents, measurement device, and handling) buffer solution pH 7.00 Certipur®, Cat.No. 1.09407, can be used.

Phenol

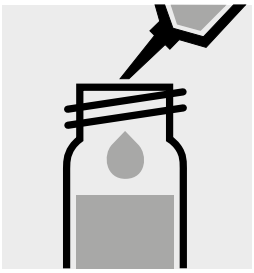
1.14551

Cell Test

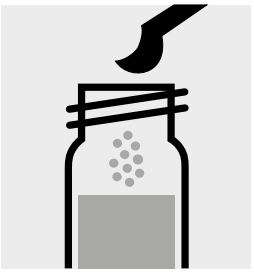
Measuring range:	0.10 – 2.50 mg/l C_6H_5OH Expression of results also possible in mmol/l.



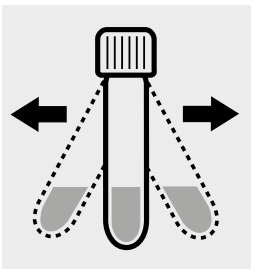
Check the pH of the sample, specified range: pH 2 – 11.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



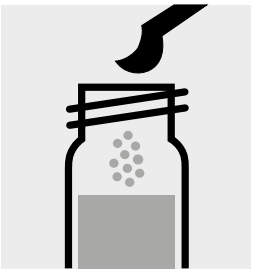
Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.



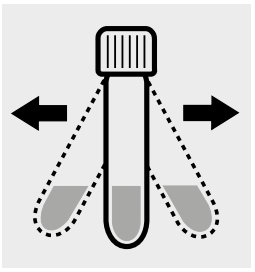
Add 1 level grey micro-spoon of **Ph-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

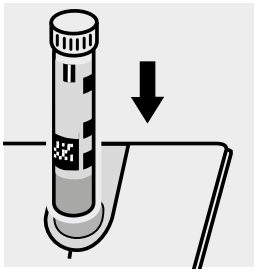


Add 1 level green micro-spoon of **Ph-2K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

Very high phenol concentrations in the sample result in a weakening of the color and false-low readings are yielded. In such cases the sample must be diluted (plausibility check).

Quality assurance:

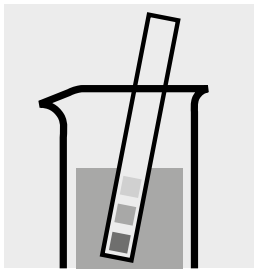
To check the measurement system (test reagents, measurement device, and handling) a phenol standard solution must be prepared from Phenol GR, Cat.No. 1.00206 (see section "Standard solutions").

Phenol

1.00856

Test

Measuring range:	0.002 – 0.100 mg/l C_6H_5OH	20-mm cell
	Expression of results also possible in mmol/l.	
Attention!	The measurement is carried out in a 20-mm rectangular cell against a blank, prepared from distilled water	
	(Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and the reagents in an analogous manner.	



Check the pH of the sample, specified range: pH 2 – 11.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Pipette 200 ml of sample into a separation funnel.

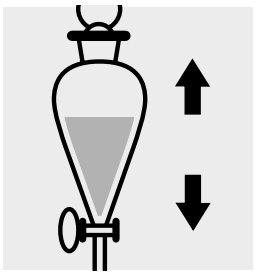
Add 5.0 ml of **Ph-1** with pipette and mix.

Add 1 level green micro-spoon of **Ph-2** and shake to dissolve the solid substance.

Add 1 level green micro-spoon of **Ph-3** and shake to dissolve the solid substance.

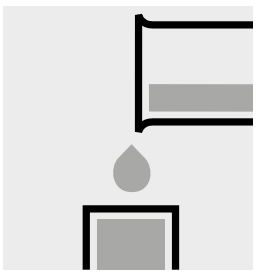
Reaction time:
30 minutes
(protected from light)

Add 10 ml of chloroform with pipette, close separation funnel.

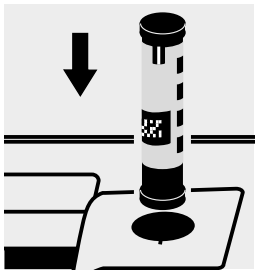


Shake vigorously for 1 minute.

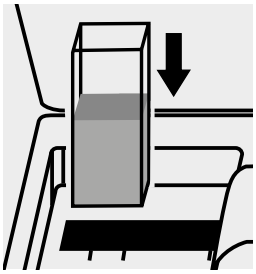
Leave to stand for 5 – 10 minutes to allow the phases to separate.



Transfer the clear **lower** phase into a cell.



Select method with AutoSelector measuring range 0.002 – 0.100 mg/l.



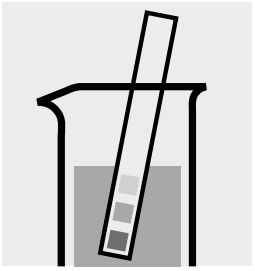
Place the cell into the cell compartment.

Phenol

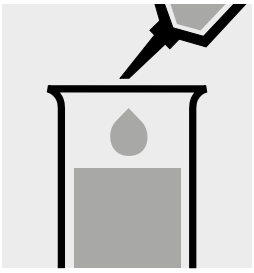
1.00856

Test

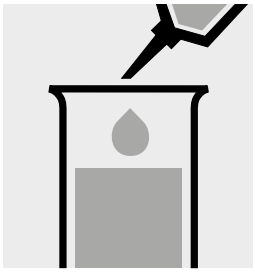
Measuring	0.10 – 5.00	mg/l C_6H_5OH	10-mm cell
range:	0.05 – 2.50	mg/l C_6H_5OH	20-mm cell
	0.025 – 1.000	mg/l C_6H_5OH	50-mm cell
	Expression of results also possible in mmol/l.		



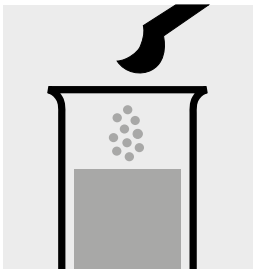
Check the pH of the sample, specified range: pH 2 – 11.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



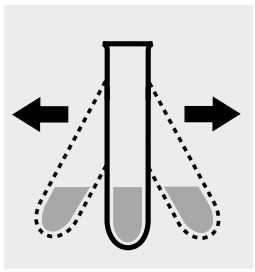
Pipette 10 ml of the sample into a test tube.



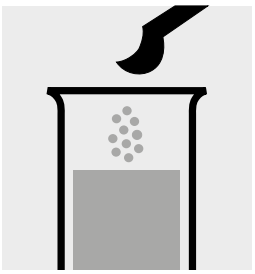
Add 1.0 ml of **Ph-1** with pipette and mix.



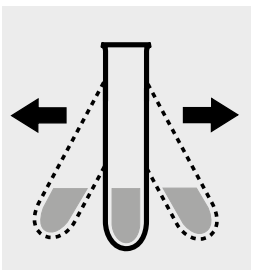
Add 1 level grey microspoon of **Ph-2**.



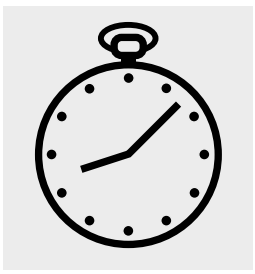
Shake vigorously to dissolve the solid substance.



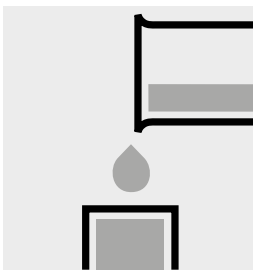
Add 1 level grey microspoon of **Ph-3**.



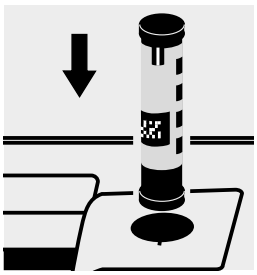
Shake vigorously to dissolve the solid substance.



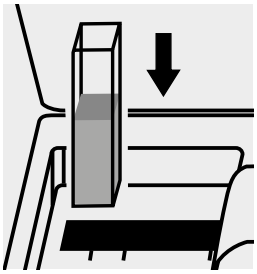
Reaction time: 10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector measuring range 0.025 – 5.00 mg/l.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a phenole standard solution must be prepared from Phenol GR, Cat.No. 1.00206 (see section "Standard solutions").

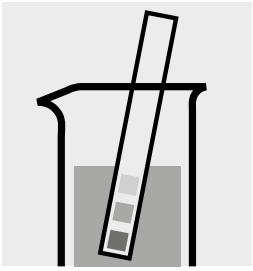
Phosphate

Determination of orthophosphate

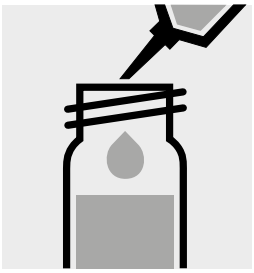
1.00474

Cell Test

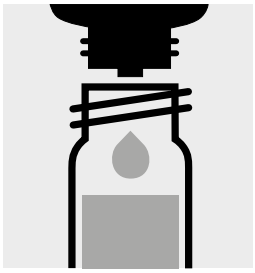
Measuring range:	0.05 – 5.00 mg/l PO_4-P
	0.2 – 15.3 mg/l PO_4
	0.11 – 11.46 mg/l P_2O_5
	Expression of results also possible in mmol/l.



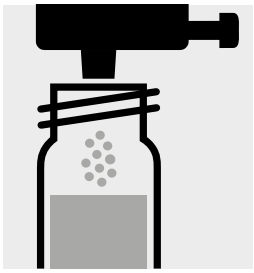
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



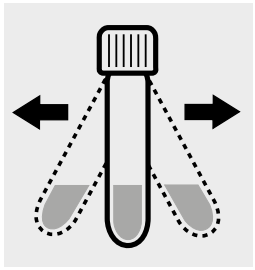
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **P-1K**, close the cell with the screw cap, and mix.

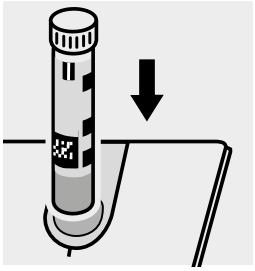


Add 1 dose of **P-2K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. No. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. No. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

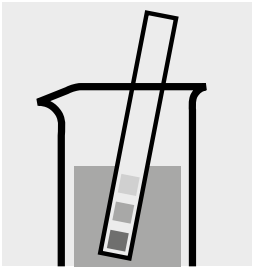
Phosphate

Determination of orthophosphate

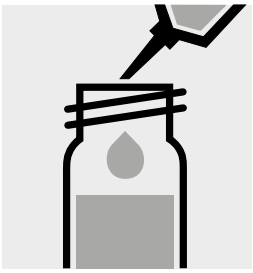
1.14543

Cell Test

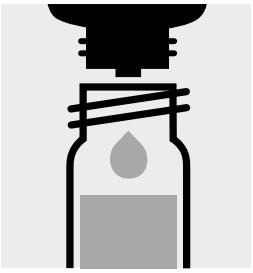
Measuring range:	0.05 – 5.00 mg/l PO_4-P
	0.2 – 15.3 mg/l PO_4
	0.11 – 11.46 mg/l P_2O_5
	Expression of results also possible in mmol/l.



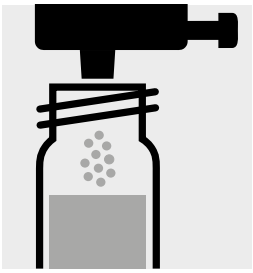
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



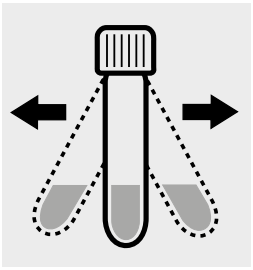
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

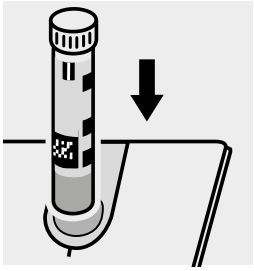


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

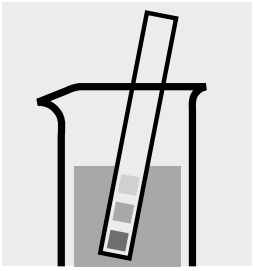
Phosphate

Determination of total phosphorus
= sum of orthophosphate, polyphosphate, and organophosphate

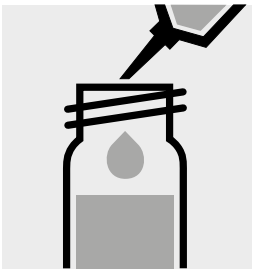
1.14543

Cell Test

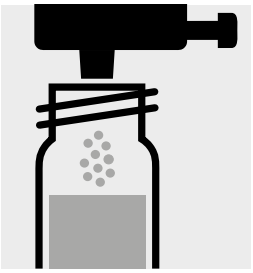
Measuring range:	0.05 – 5.00 mg/l P
	0.2 – 15.3 mg/l PO_4
	0.11 – 11.46 mg/l P_2O_5
	Expression of results also possible in mmol/l.



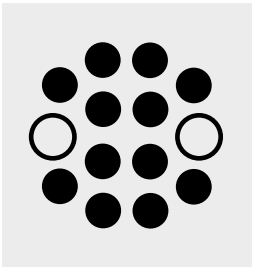
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



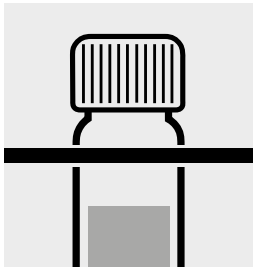
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



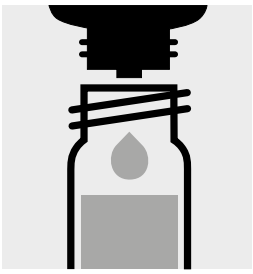
Add 1 dose of **P-1K** using the green dose-metering cap, close the cell with the screw cap.



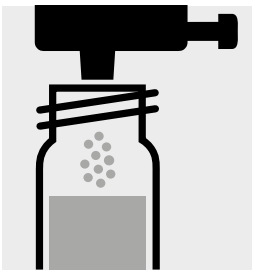
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



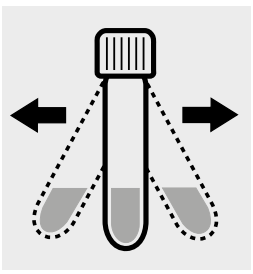
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

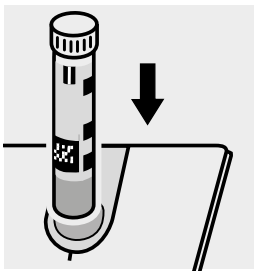


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25046 and 1.25047.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Phosphate

Differentiation between total phosphorus, orthophosphate, and organophosphate

1.14543

Cell Test

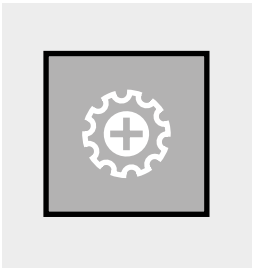
Measuring range:	0.05 – 5.00 mg/l PO_4-P or P
	0.2 – 15.3 mg/l PO_4
	0.11 – 11.46 mg/l P_2O_5

If the aim is to differentiate between orthophosphate (PO_4-P) and P org*, after selecting the method it is possible to set the method-specific "Differentiation" mode.

* P org is the sum of polyphosphate and organophosphate.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **55**.

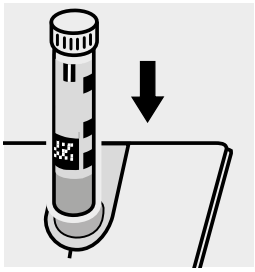


Tap the <Settings> button.
Select "Differentiation" and activate.

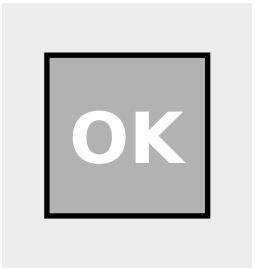
Confirm with <OK>.

Perform determination of **total phosphorus** (see analytical procedure "Determination of total phosphorus" with 1.14543).
= cell Σ P

After the reaction time has expired:



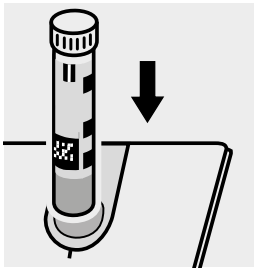
Place the **cell Σ P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.



Confirm with <OK>.

Perform determination of **orthophosphate** (see analytical procedure "Determination of ortho-phosphate" with 1.14543).
= cell PO_4-P

After the reaction time has expired:



Place the **cell PO_4-P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Σ P), B (PO_4-P), and C (P_{org}) are shown in the display in mg/l.

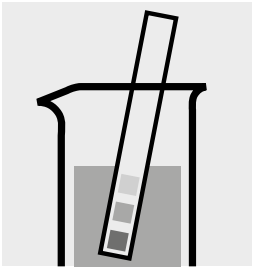
Phosphate

Determination of orthophosphate

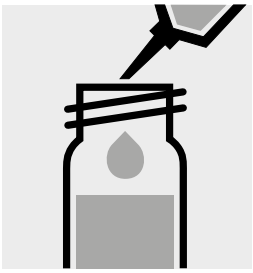
1.00475

Cell Test

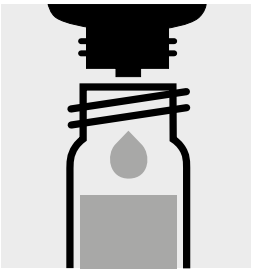
Measuring range:	0.5 – 25.0 mg/l PO_4-P
	1.5 – 76.7 mg/l PO_4
	1.1 – 57.3 mg/l P_2O_5
	Expression of results also possible in mmol/l.



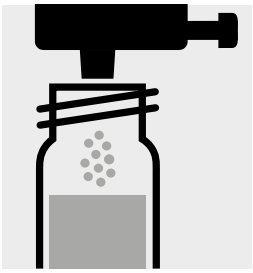
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



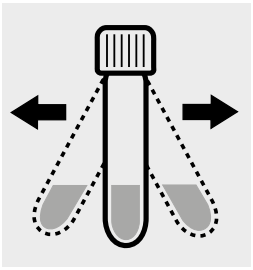
Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **P-1K**, close the cell with the screw cap, and mix.

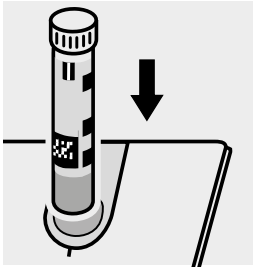


Add 1 dose of **P-2K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. Nos. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. Nos. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20 and 80, Cat.Nos. 1.14675 and 1.14738.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

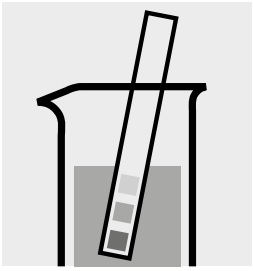
Phosphate

Determination of orthophosphate

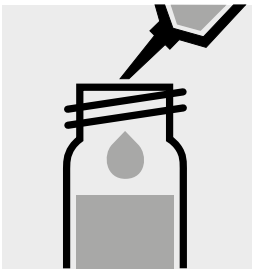
1.14729

Cell Test

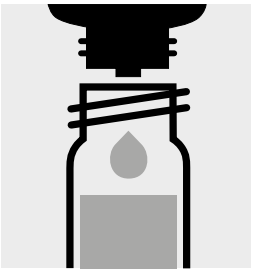
Measuring range:	0.5 – 25.0 mg/l PO_4-P
	1.5 – 76.7 mg/l PO_4
	1.1 – 57.3 mg/l P_2O_5
	Expression of results also possible in mmol/l.



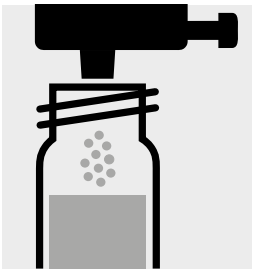
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



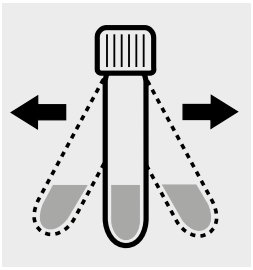
Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

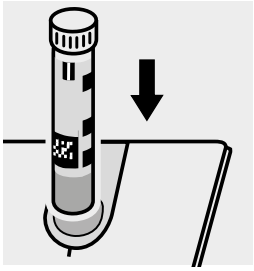


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20 and 80, Cat.Nos. 1.14675 and 1.14738.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

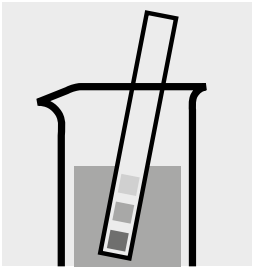
Phosphate

Determination of total phosphorus
= sum of orthophosphate, polyphosphate, and organophosphate

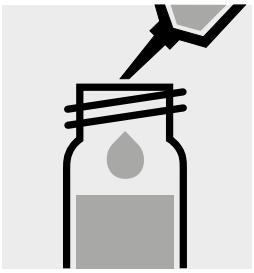
1.14729

Cell Test

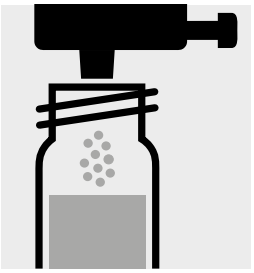
Measuring range:	0.5 – 25.0 mg/l P
	1.5 – 76.7 mg/l PO_4
	1.1 – 57.3 mg/l P_2O_5
	Expression of results also possible in mmol/l.



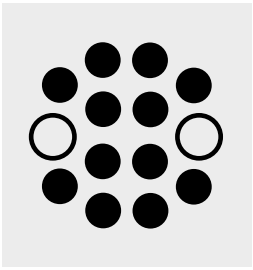
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



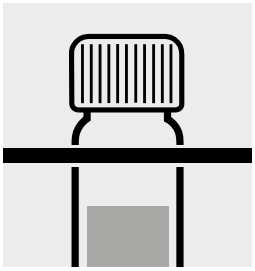
Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



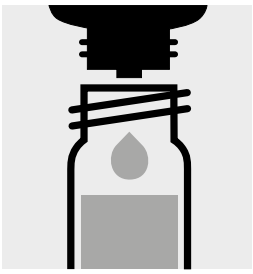
Add 1 dose of **P-1K** using the green dose-metering cap, close the cell with the screw cap.



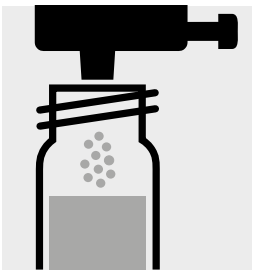
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



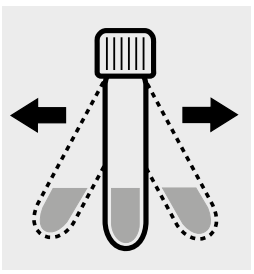
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

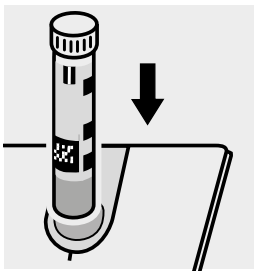


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20 and 80, Cat.Nos. 1.14675 and 1.14738, or as well as the Standard solutions for photometric applications, Cat.Nos. 1.25047 and 1.25048.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck) is highly recommended.

Phosphate

Differentiation between total phosphorus, orthophosphate, and organophosphate

1.14729

Cell Test

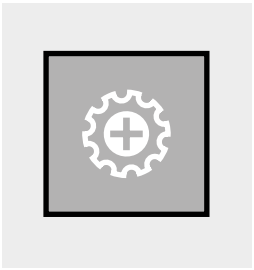
Measuring range:	0.5 – 25.0 mg/l PO_4-P or P
	1.5 – 76.7 mg/l PO_4
	1.1 – 57.3 mg/l P_2O_5

If the aim is to differentiate between orthophosphate (PO_4-P) and P org*, after selecting the method it is possible to set the method-specific "Differentiation" mode.

* P org is the sum of polyphosphate and organophosphate.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **86**.

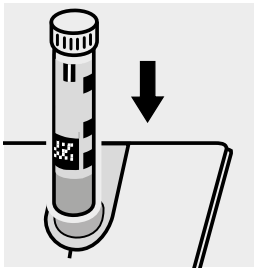


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **total phosphorus** (see analytical procedure "Determination of total phosphorus" with 1.14729).
= cell Σ P

After the reaction time has expired:

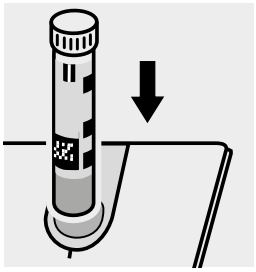


Place the **cell Σ P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **orthophosphate** (see analytical procedure "Determination of ortho-phosphate" with 1.14729).
= cell PO_4-P

After the reaction time has expired:



Place the **cell PO_4-P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Σ P), B (PO_4-P), and C (P_{org}) are shown in the display in mg/l.

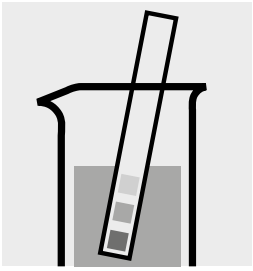
Phosphate

Determination of orthophosphate

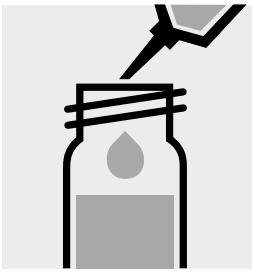
1.00616

Cell Test

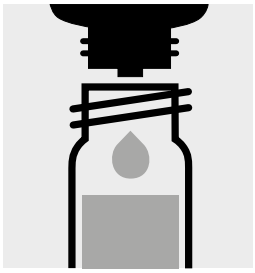
Measuring	3.0 – 100.0	mg/l PO_4-P
range:	9 – 307	mg/l PO_4
	7 – 229	mg/l P_2O_5
	Expression of results also possible in mmol/l.	



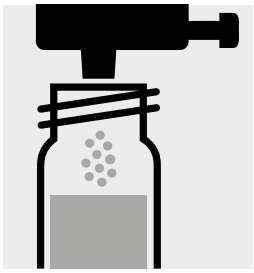
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



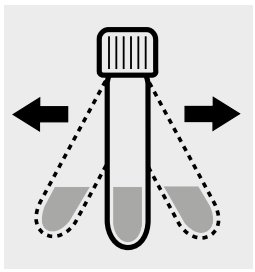
Pipette 0.20 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **PO_4-1K**, close the cell with the screw cap, and mix.

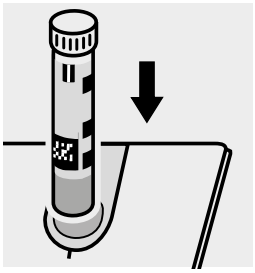


Add 1 dose of **PO_4-2K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. Nos. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. Nos. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

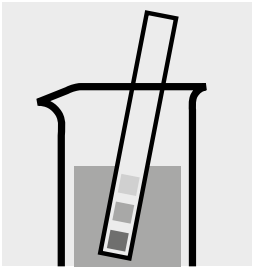
Phosphate

Determination of orthophosphate

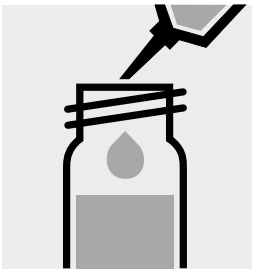
1.00673

Cell Test

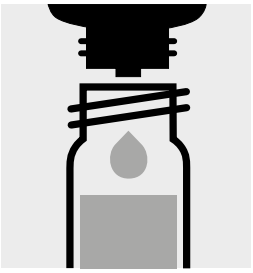
Measuring	3.0 – 100.0	mg/l PO_4-P
range:	9 – 307	mg/l PO_4
	7 – 229	mg/l P_2O_5
	Expression of results also possible in mmol/l.	



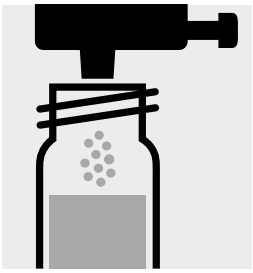
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



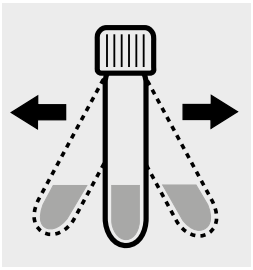
Pipette 0.20 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

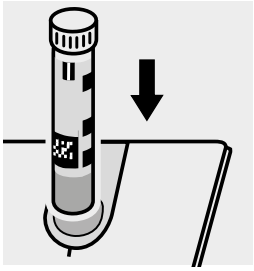


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

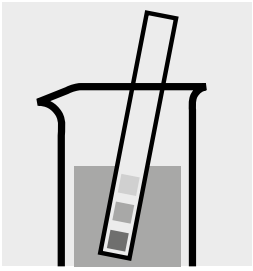
Phosphate

Determination of total phosphorus
= sum of orthophosphate, polyphosphate, and organophosphate

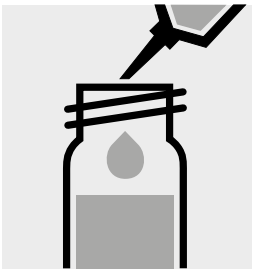
1.00673

Cell Test

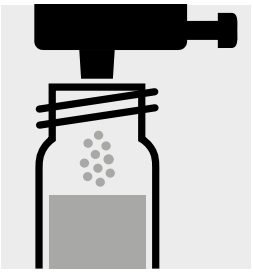
Measuring	3.0 – 100.0	mg/l P
range:	9 – 307	mg/l PO_4
	7 – 229	mg/l P_2O_5
	Expression of results also possible in mmol/l.	



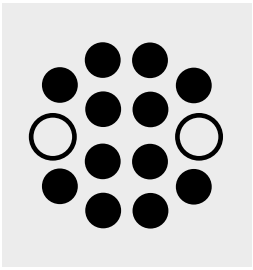
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



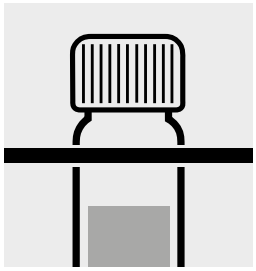
Pipette 0.20 ml of the sample into a reaction cell, close with the screw cap, and mix.



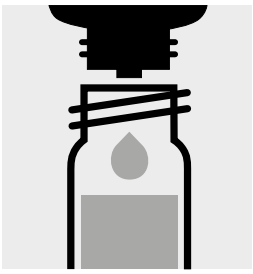
Add 1 dose of **P-1K** using the green dose-metering cap, close the cell with the screw cap.



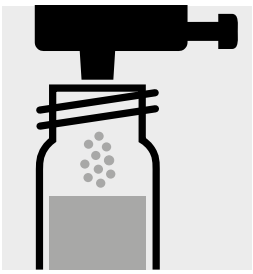
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



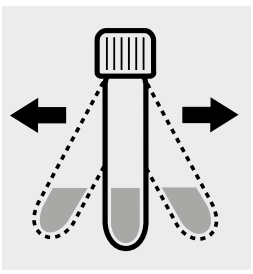
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



Add 5 drops of **P-2K**, close the cell with the screw cap, and mix.

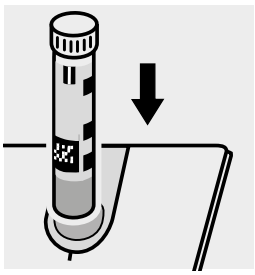


Add 1 dose of **P-3K** using the blue dose-metering cap, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.25047, 1.25048, and 1.25049.

Phosphate

Differentiation between total phosphorus, orthophosphate, and organophosphate

1.00673

Cell Test

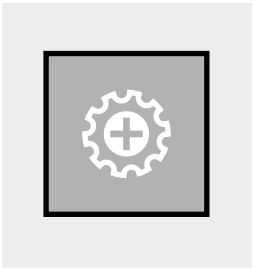
Measuring	3.0 – 100.0	mg/l PO_4-P or P
range:	9 – 307	mg/l PO_4
	7 – 229	mg/l P_2O_5

If the aim is to differentiate between orthophosphate (PO_4-P) and P org*, after selecting the method it is possible to set the method-specific "Differentiation" mode.

* P org is the sum of polyphosphate and organophosphate.

Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **214**.

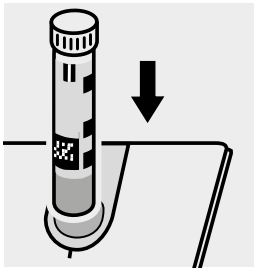


Tap the <Settings> button.
Select "Differentiation" and activate.

Confirm with <OK>.

Perform determination of **total phosphorus** (see analytical procedure "Determination of total phosphorus" with 1.00673).
= cell Σ P

After the reaction time has expired:

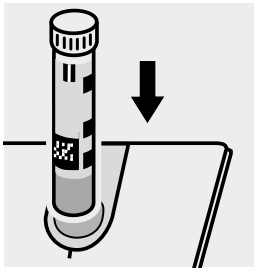


Place the **cell Σ P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.

Confirm with <OK>.

Perform determination of **orthophosphate** (see analytical procedure "Determination of ortho-phosphate" with 1.00673).
= cell PO_4-P

After the reaction time has expired:



Place the **cell PO_4-P** into the cell compartment.
Align the mark on the cell with that on the photo-meter.
The measurement is performed automatically.

Confirm with <OK>.
The results A (Σ P), B (PO_4-P), and C (P_{org}) are shown in the display in mg/l.

Phosphate

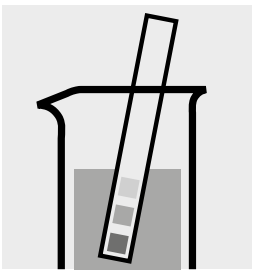
Determination of orthophosphate

1.14848

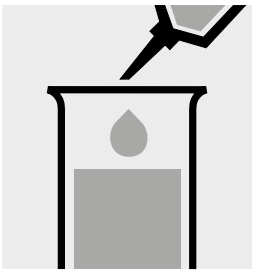
Test

Measuring	0.05	– 5.00	mg/l PO_4-P	0.2	– 15.3	mg/l PO_4	0.11	– 11.46	mg/l P_2O_5	10-mm cell
range:	0.03	– 2.50	mg/l PO_4-P	0.09	– 7.67	mg/l PO_4	0.07	– 5.73	mg/l P_2O_5	20-mm cell
	0.005	– 1.000	mg/l PO_4-P	0.015	– 3.066	mg/l PO_4	0.011	– 2.291	mg/l P_2O_5	50-mm cell
	0.0025	– 0.5000	mg/l PO_4-P	0.0077	– 1.5331	mg/l PO_4	0.0057	– 1.1457	mg/l P_2O_5	100-mm cell
	Expression of results also possible in mmol/l.									

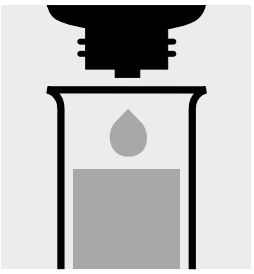
Measuring ranges: 0.005 – 5.00 mg/l PO_4-P



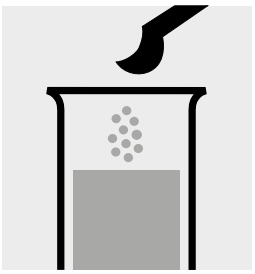
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



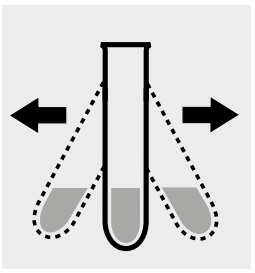
Pipette 5.0 ml of the sample into a test tube.



Add 5 drops of **PO_4-1** and mix.

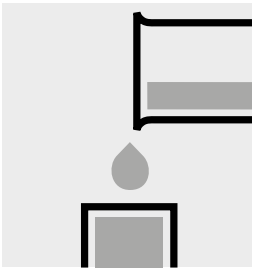


Add 1 level blue micro-spoon of **PO_4-2**.

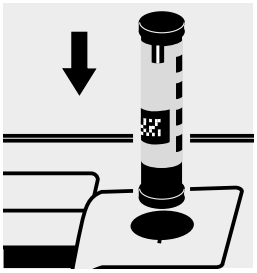


Shake vigorously to dissolve the solid substance.

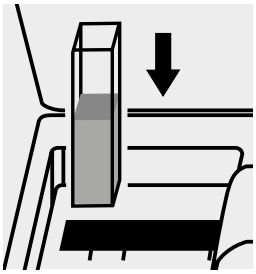
Reaction time:
5 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For measurement in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each.
Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate, and organophosphate** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of phosphorus (Σ P).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676.

Ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

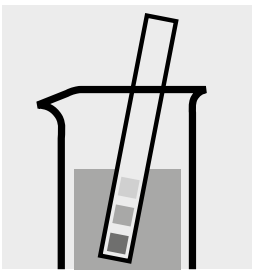
Phosphate

Determination of orthophosphate

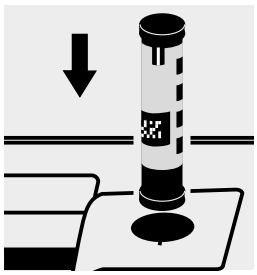
1.14848

Test

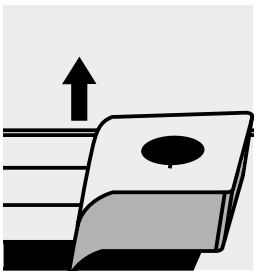
Measuring range: 0.0025 – 0.5000 mg/l PO_4-P



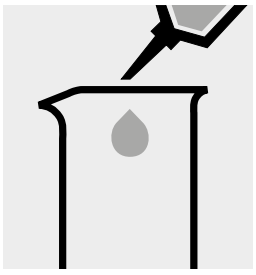
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



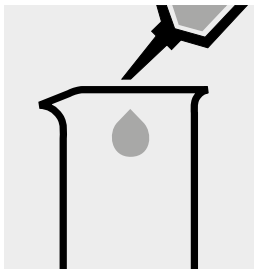
Select method with AutoSelector.



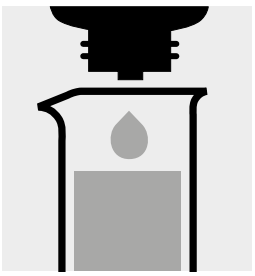
Remove the round-cell holder.



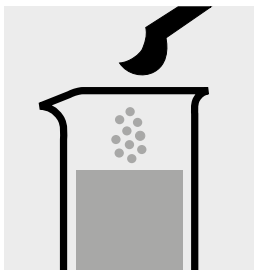
Place 20 ml of sample into a suitable vessel.



Place 20 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754 is recommended) into a second suitable vessel.
(Blank)



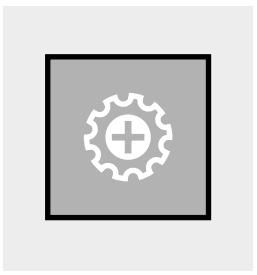
Add to each vessel 20 drops of **PO_4-1** and mix.



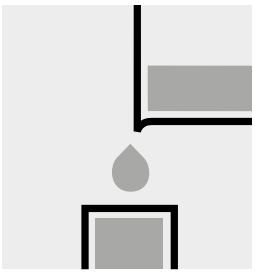
Add to each vessel 4 level blue microspoon of **PO_4-2**.

Shake both vessels vigorously to dissolve the solid substance.

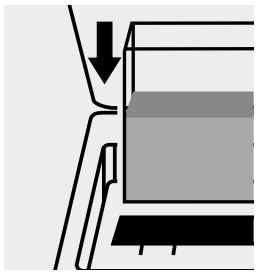
Reaction time:
5 minutes



Tap the <Settings> button.
Select "Reagent blank".

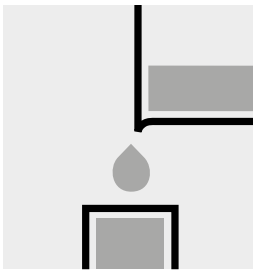


Transfer the blank into the cell.

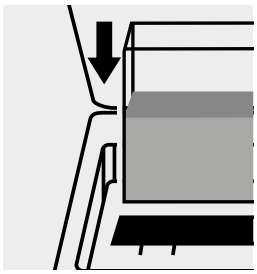


Insert the blank cell into the cell compartment.

Select "User RB".
Confirm with <OK>.



Transfer the measurement sample into the cell.



Insert the cell containing the sample into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

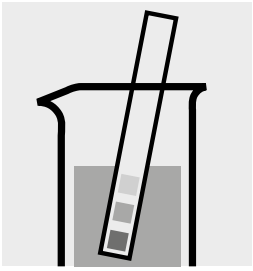
Phosphate

Determination of orthophosphate

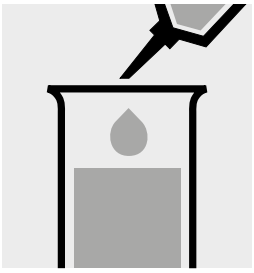
1.00798

Test

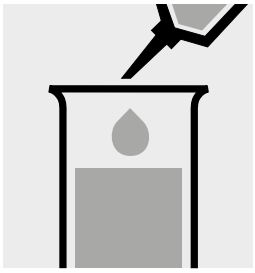
Measuring range:	1.0 – 100.0 mg/l PO_4-P	3 – 307 mg/l PO_4	2 – 229 mg/l P_2O_5	10-mm cell
	Expression of results also possible in mmol/l.			



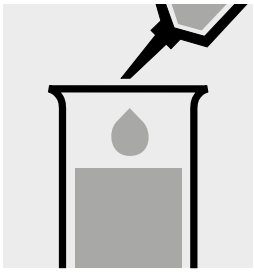
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



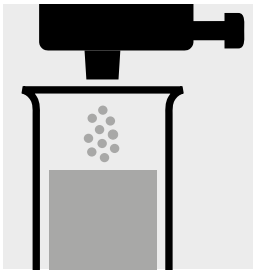
Pipette 8.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a test tube.



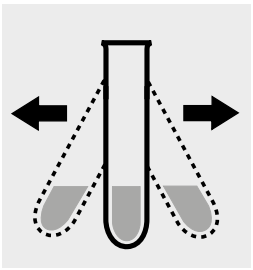
Add 0.50 ml of the sample with pipette and mix.



Add 0.50 ml of **PO_4-1** with pipette and mix.

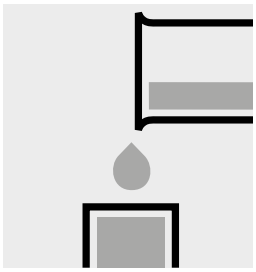


Add 1 dose of **PO_4-2** using the blue dose-metering cap.

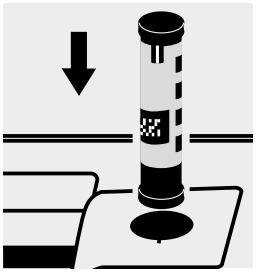


Shake vigorously to dissolve the solid substance.

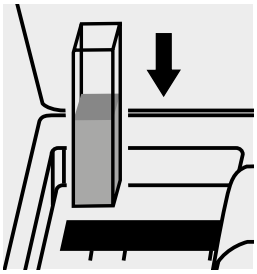
Reaction time:
5 minutes



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. Nos. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. Nos. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

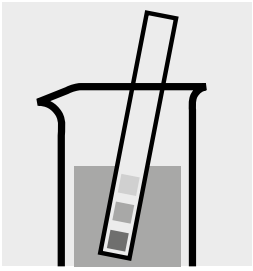
Phosphate

Determination of orthophosphate

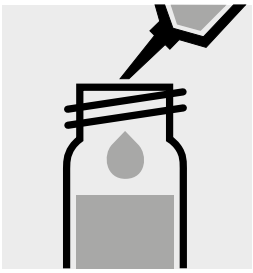
1.14546

Cell Test

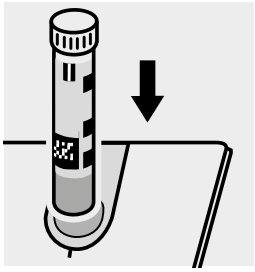
Measuring range:	0.5 – 25.0 mg/l PO_4-P
	1.5 – 76.7 mg/l PO_4
	1.1 – 57.3 mg/l P_2O_5
	Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. Nos. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. Nos. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

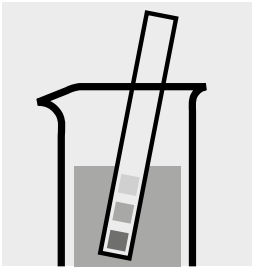
Phosphate

Determination of orthophosphate

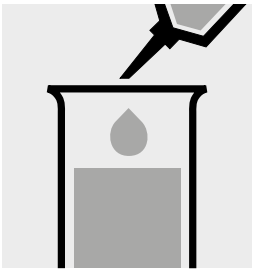
1.14842

Test

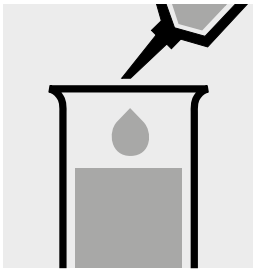
Measuring	1.0 – 30.0 mg/l PO_4-P	3.1 – 92.0 mg/l PO_4	2.3 – 68.7 mg/l P_2O_5	10-mm cell
range:	0.5 – 15.0 mg/l PO_4-P	1.5 – 46.0 mg/l PO_4	1.1 – 34.4 mg/l P_2O_5	20-mm cell
	Expression of results also possible in mmol/l.			



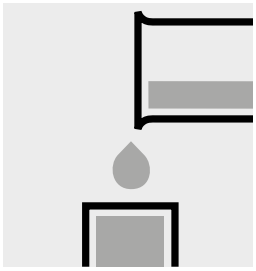
Check the pH of the sample, specified range: pH 0 – 10.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



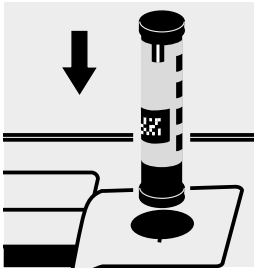
Pipette 5.0 ml of the sample into a test tube.



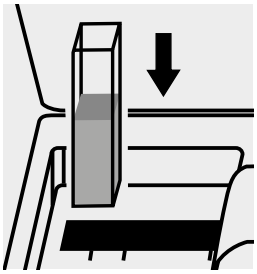
Add 1.2 ml of **PO_4-1** with piette and mix.



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

For the determination of **total phosphorus = sum of orthophosphate, polyphosphate and organophosphate** either Phosphate Cell Test, Cat. Nos. 1.14543, 1.14729, and 1.00673 or Phosphate Test, Cat. No. 1.14848 in conjunction with Crack Set 10/10C, Cat. Nos. 1.14687 resp. 1.14688 can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use phosphate standard solution Certipur®, Cat.No. 1.19898, concentration 1000 mg/l PO_4^{3-}, can be used after diluting accordingly.

Phosphatide

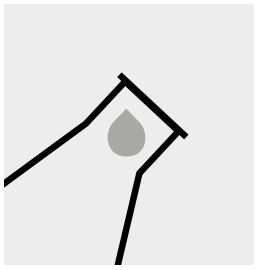
in milk and dairy products

corresponds to **German Food and Feed Code §64 LFGB 01.00-41**

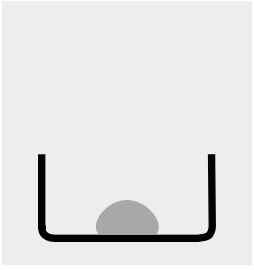
Application

Measuring range:	0 – 750 mg/100 g P	10-mm cell	Method No. 2535
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Preparation:
Extraction of fat and incineration

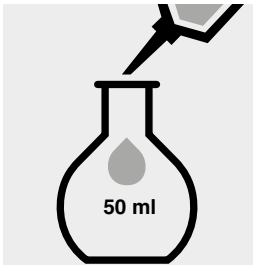


Weigh sample, accurately weighed to 10 mg, into a Mojonnier extraction tube, add **sodium chloride (solution)**, and extract acc. to §64 LFGB 01.00-41 [1].

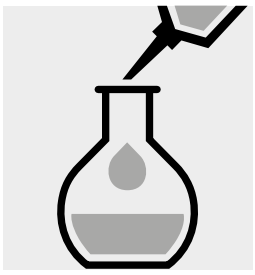


After extracting, incinerate acc. to §64 LFGB 01.00-41 [1].

Phosphatide determination:
Reagent blank

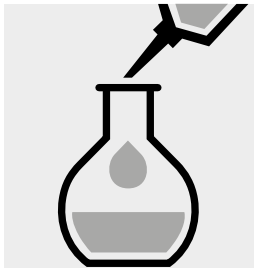


Place 20 ml of **sulfuric acid 0.05 mol/l** into a 50-ml volumetric flask.

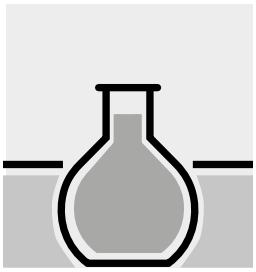


Add 20 ml of **sodium molybdate/ascorbic acid reagent** and mix.

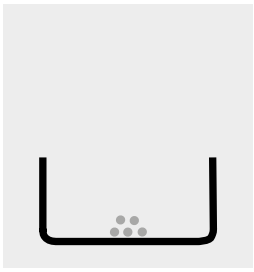
Phosphatide determination:
Measurement sample



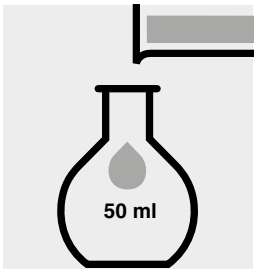
Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.



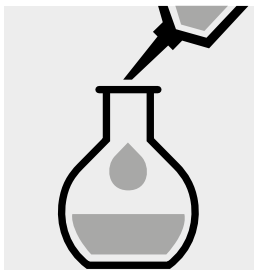
Incubate acc. to §64 LFGB 01.00-41 [1]: **reagent blank**.



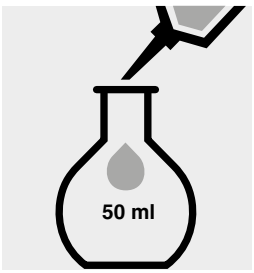
Prepare ash acc. to §64 LFGB 01.00-41 [1].



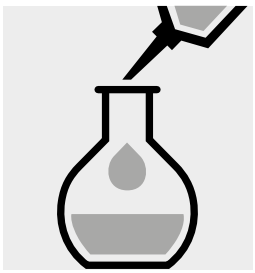
Transfer to a 50-ml volumetric flask using **sulfuric acid 0.05 mol/l**.



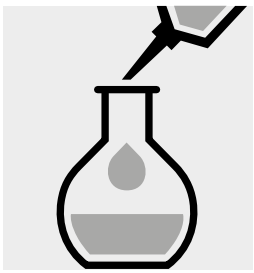
Make up the contents of the volumetric flask to the mark with **sulfuric acid 0.05 mol/l** and mix thoroughly:
solution 1.



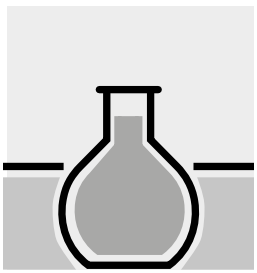
Place 20 ml of **solution 1** into a 50-ml volumetric flask.



Add 20 ml of **sodium molybdate/ascorbic acid reagent** and mix.



Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.



Incubate acc. to §64 LFGB 01.00-41 [1]: **measurement sample**.

Phosphatide

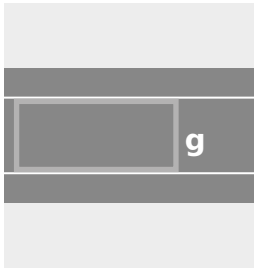
in milk and dairy products

corresponds to **German Food and Feed Code §64 LFGB 01.00-41**

Application

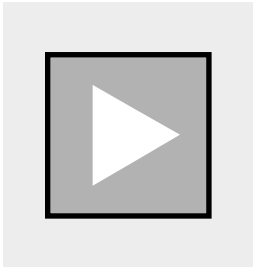
Measurement:

Select method no. **2535**. Perform the zero adjustment and confirm by pressing the <OK> button.

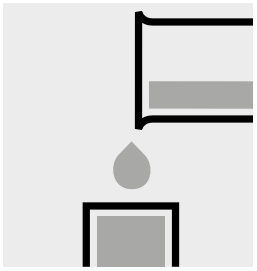


Enter the sample weight in grams.

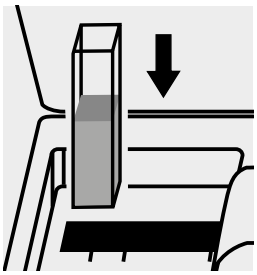
Confirm with <OK>.



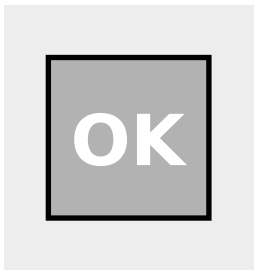
Tap the <Start> button.



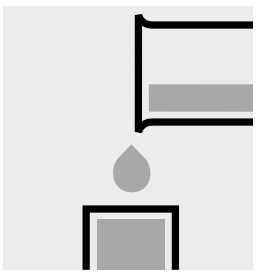
Transfer the solution **"reagent blank"** into the cell.



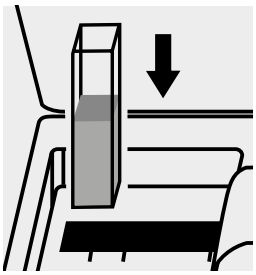
Place the cell into the cell compartment.
The blank measurement is performed automatically.



Confirm with <OK>.

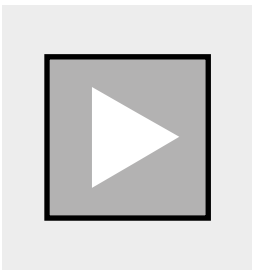


Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

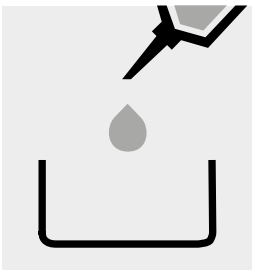
Phosphorus (total)
in fuit and vegetable juices

corresponds to **EN 1136** and **German Food and Feed Code §64 LFGB 31.00-6**

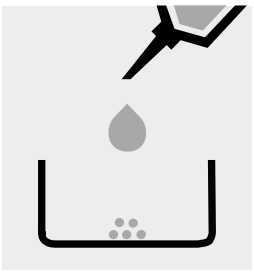
Application

Measuring range:	0.0 – 300.0 mg/l P	10-mm cell	Method No. 2534
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

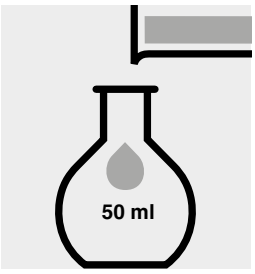
Preparation:



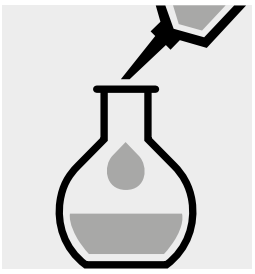
Pipette 25.0 ml of sample into a platinum dish and incinerate acc. to EN 1136 [3].



Dissolve the ash in 2 - 3 ml of **hydrochloric acid 2 mol/l**.

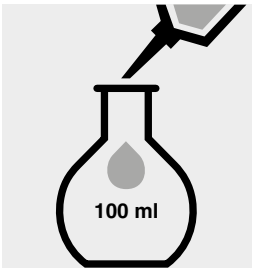


Transfer the solution to a 50-ml volumetric flask.

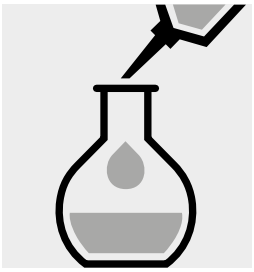


Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly: **pretreated sample solution**.

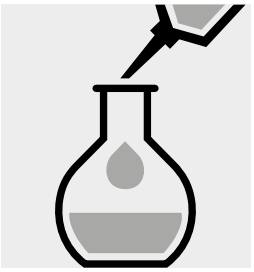
Phosphorus determination:
Reagent blank



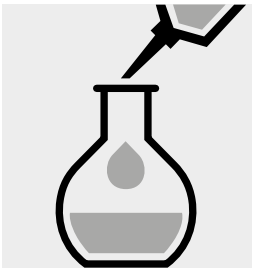
Place 50 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a 100-ml volumetric flask.



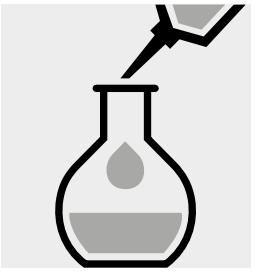
Add 20 ml of **sulfuric acid 1 mol/l**.



Add 2 ml **ammonium heptamolybdate reagent**.

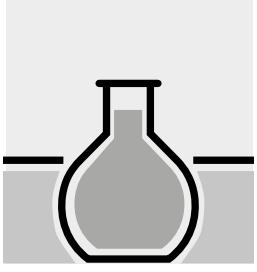


Add 2 ml of **ascorbic acid reagent** and mix.

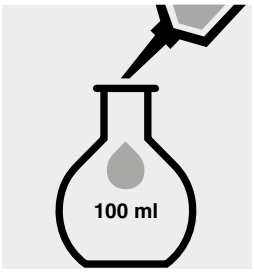


Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.

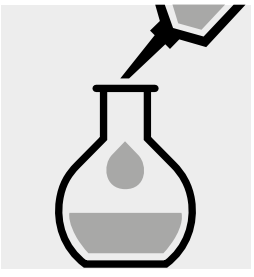
Phosphorus determination:
Measurement sample



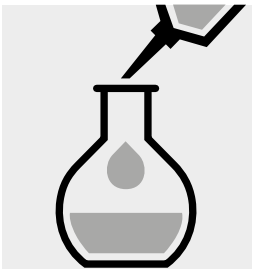
Incubate acc. to EN 1136 [1] or §64 LFGB 31.00-6 [2]: **reagent blank**.



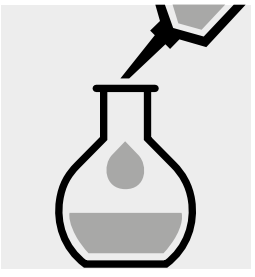
Pipette a suitable volume of the prepared sample solution to the nearest 0.1 ml into a 100-ml volumetric flask.



Add approx. 50 ml distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended).



Add 20 ml of **sulfuric acid 1 mol/l**.



Add 2 ml **ammonium heptamolybdate reagent**.

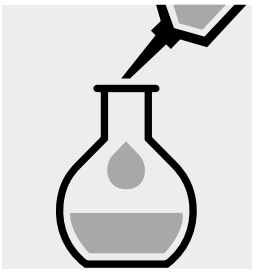
Phosphorus (total)

in fuit and vegetable juices

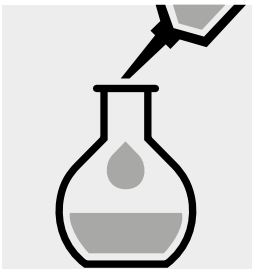
corresponds to **EN 1136** and **German Food and Feed Code §64 LFGB 31.00-6**

Application

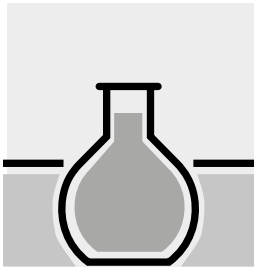
Measurement:



Add 2 ml of **ascorbic acid reagent** and mix.

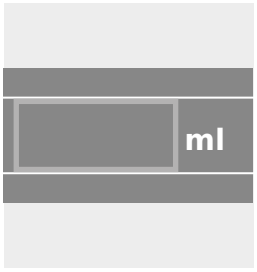


Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.



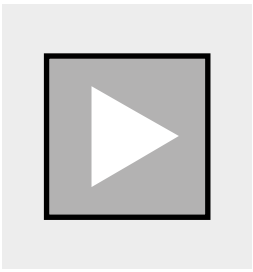
Incubate acc. to EN 1136 [1] or §64 LFGB 31.00-6 [2]: **measurement sample**.

Select method no. **2534**. Perform the zero adjustment and confirm by pressing the <OK> button.

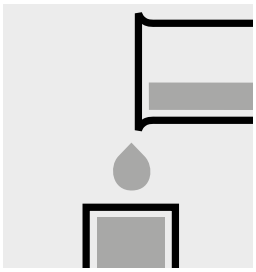


Enter the volumes of the sample solution in milliliters.

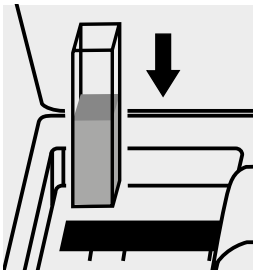
Confirm with <OK>.



Tap the <Start> button.

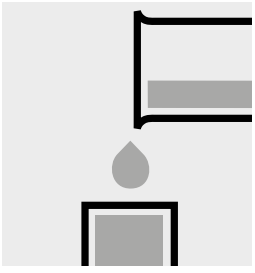


Transfer the solution **"reagent blank"** into the cell.

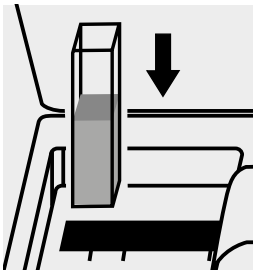


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.



Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

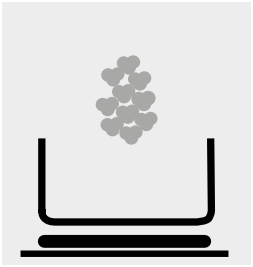
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Phosphorus (total)
in meat and meat products
corresponds to **German Food and Feed Code §64 LFGB 06.00-9**

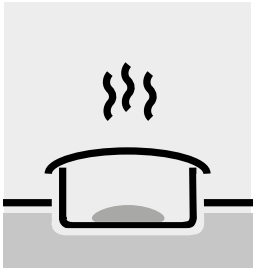
Application

Measuring range:	0.000 – 2.500 g/100 g P_2O_5	10-mm cell	Method No. 2533
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Preparation:

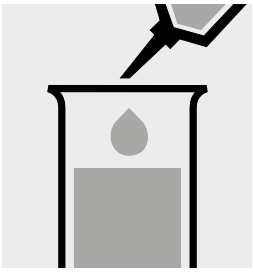


Weigh sample, accurately weighed to 1 mg, into a suitable vessel and perform an incinerate acc. to §64 LFGB 06.00-4 [3].

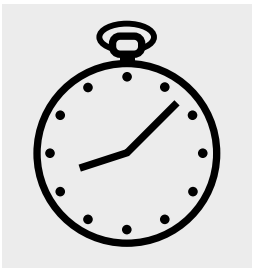


Hydrolyze the resultant ash acc. to §64 LFGB 06.00-9, section 7.3 [1]: **pretreated sample solution**.

Phosphorus determination:
Reagent blank

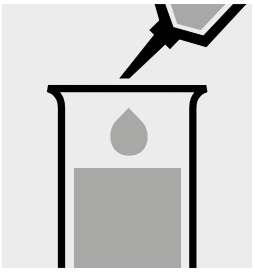


Mix 2 ml distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) with 8 ml of **reagent solution: reagent blank**.

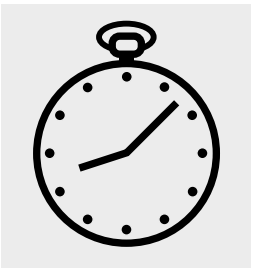


Incubation time: 15 minutes at room temperature

Phosphorus determination:
Measurement sample



Mix 2 ml of pretreated sample with 8 ml of **reagent solution: measurement sample**.



Incubation time: 15 minutes at room temperature

Phosphorus (total)

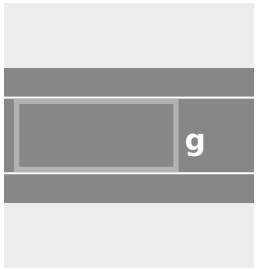
in meat and meat products

corresponds to **German Food and Feed Code §64 LFGB 06.00-9**

Application

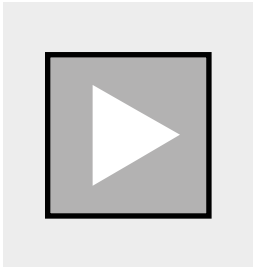
Measurement:

Select method no. **2533**. Perform the zero adjustment and confirm by pressing the <OK> button.

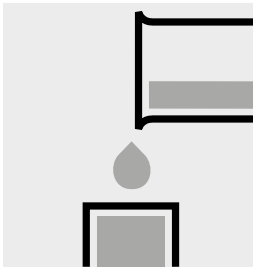


Enter the sample weight in grams.

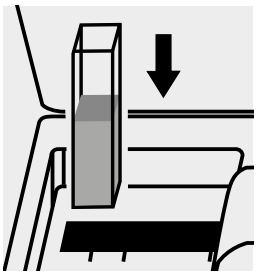
Confirm with <OK>.



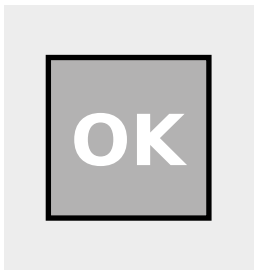
Tap the <Start> button.



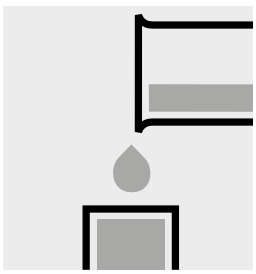
Transfer the solution **"reagent blank"** into the cell.



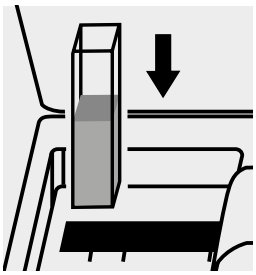
Place the cell into the cell compartment.
The blank measurement is performed automatically.



Confirm with <OK>.

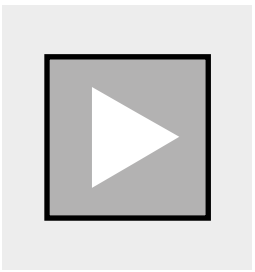


Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Phosphorus (total)

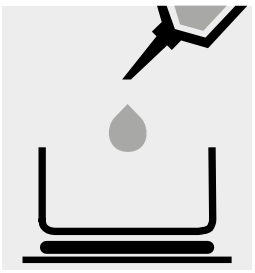
in milk and dairy products

corresponds to **German Food and Feed Code §64 LFGB 01.00-92 [1]**

Application

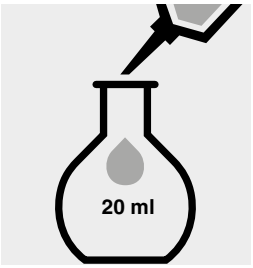
Measuring range:	0 – 2000 mg/100 g P	10-mm cell	Method No. 2532
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Preparation:

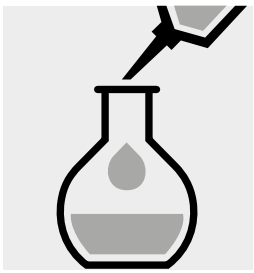


Weigh sample, accurately weighed to 1 mg, into a suitable vessel and perform a wet digestion or incinerate acc. to §64 LFGB 01.00-92 [1].

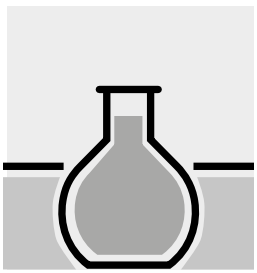
Phosphorus determination:
Reagent blank



Place 10 ml of **sodium molybdate/ascorbic acid reagent** into a 20-ml volumetric flask.

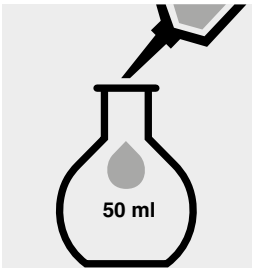


Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.

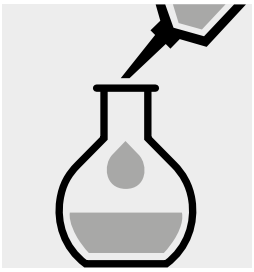


Incubate acc. to §64 LFGB 01.00-92 [1]: **reagent blank**.

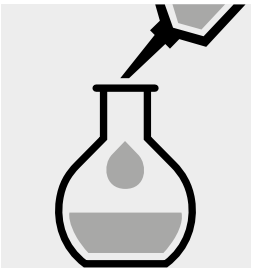
Phosphorus determination:
Measurement sample



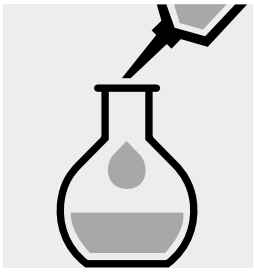
Place 1 ml of pretreated sample into a 50-ml volumetric flask.



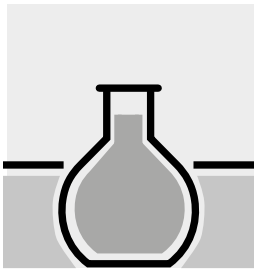
Add approx. 20 ml distilled water (Water for analysis EMSURE®, Cat. No. 1.16754, is recommended).



Add 25 ml of **sodium molybdate/ascorbic acid reagent** and mix.



Make up the contents of the volumetric flask to the mark with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and mix thoroughly.



Incubate acc. to §64 LFGB 01.00-92 [1]: **measurement sample**.

Phosphorus (total)

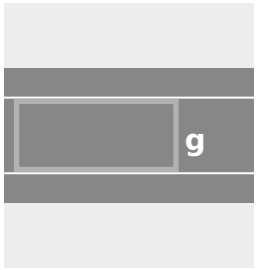
in milk and dairy products

corresponds to **German Food and Feed Code §64 LFGB 01.00-92 [1]**

Application

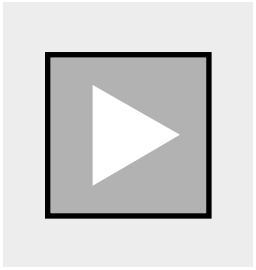
Measurement:

Select method no. **2532**. Perform the zero adjustment and confirm by pressing the <OK> button.

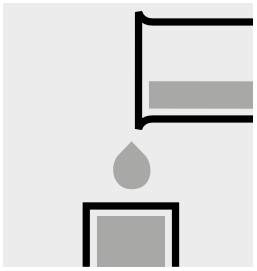


Enter the sample weight in grams.

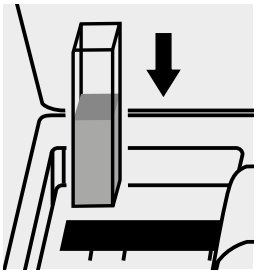
Confirm with <OK>.



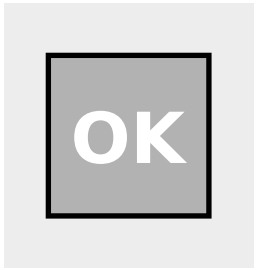
Tap the <Start> button.



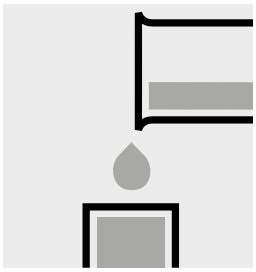
Transfer the solution **"reagent blank"** into the cell.



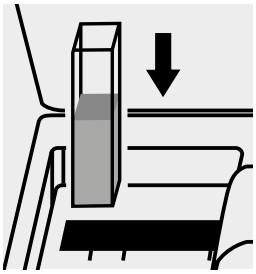
Place the cell into the cell compartment.
The blank measurement is performed automatically.



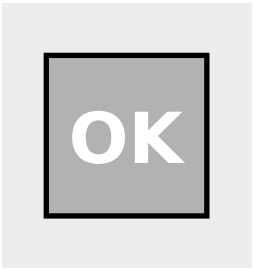
Confirm with <OK>.



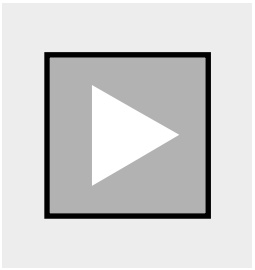
Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

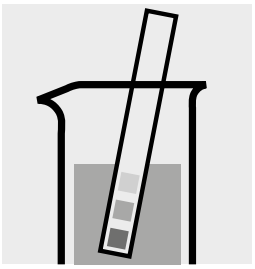
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

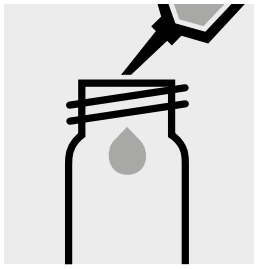
Platinum in water and wastewater

Application

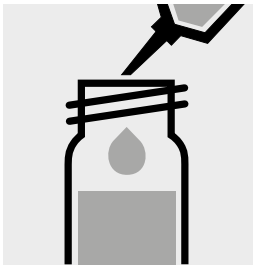
Measuring range:	0.10 – 1.25 mg/l Pt	10-mm cell	Method No. 134
Attention!	The measurement is carried out at 690 nm in a 10-mm rectangular cell against a blank, prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) and the reagents in an analogous manner.		



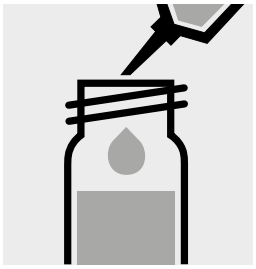
Check the pH of the sample, specified range: pH 2 – 5.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

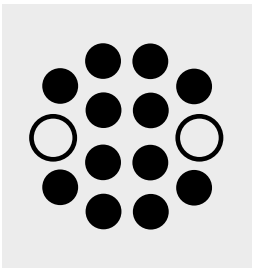


Add 1.0 ml of **reagent 1** with pipette, close the cell with the screw cap, and mix.

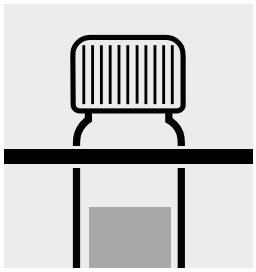


Add 0.50 ml of **reagent 2** with pipette, close the cell with the screw cap, and mix.

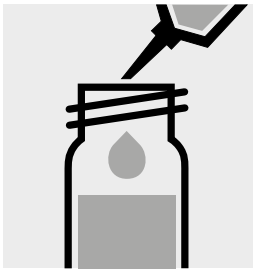
Check the pH of the sample, specified value: pH 6.5.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



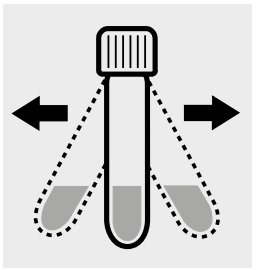
Heat the cell in the thermoreactor at 100 °C for 5 minutes.



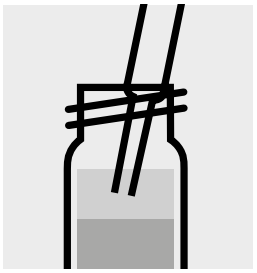
Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.



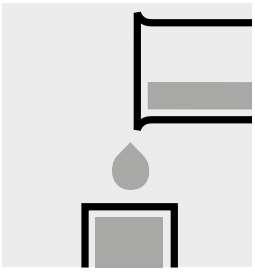
Add 5.0 ml **Isobutylmethylketone GR** (Cat.No. 1.06146) with pipette, close the cell with the screw cap.



Shake the cell vigorously for 1 minute.
Leave to stand to allow phases to separate.

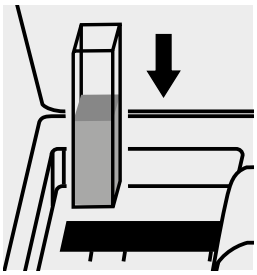


Aspirate the organic-clear upper phase from the tube with pipette and dry over **sodium sulfate anhydrous** (Cat.No. 1.06649).



Transfer the dried solution into a cell.

Select method no. **134**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Note:

Empty cells with screw caps, Cat.No. 1.14724 are recommended for the preparation. These cells can be sealed with the screw caps, thus enabling a hazard-free mixing of the sample.

Important:

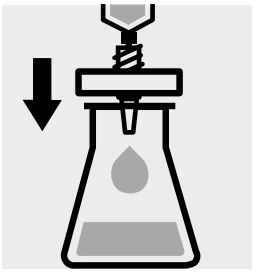
The exact composition and preparation of the reagents 1 and 2 used are given in the corresponding application, which also includes further information on the method employed. This application can be downloaded from the website.

Potassium

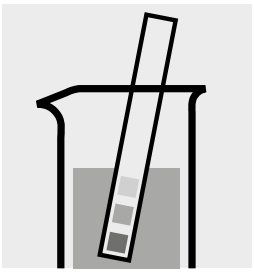
1.14562

Cell Test

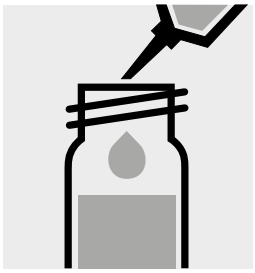
Measuring range:	5.0 – 50.0 mg/l K Expression of results also possible in mmol/l.



Filter turbid samples.

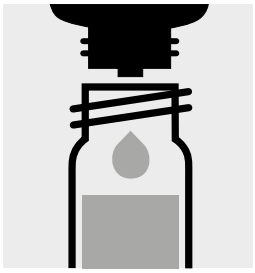


Check the pH of the sample, specified range: pH 3 – 12.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

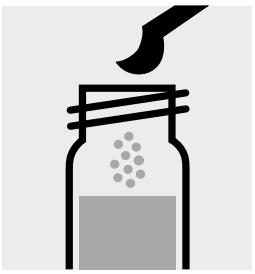


Pipette 2.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

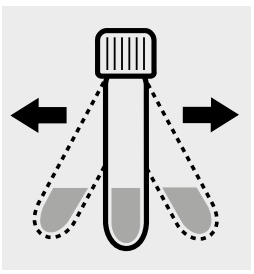
Check the pH, specified range: pH 10.0 – 11.5.



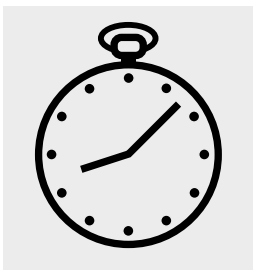
Add 6 drops of **K-1K**, close the cell with the screw cap, and mix.



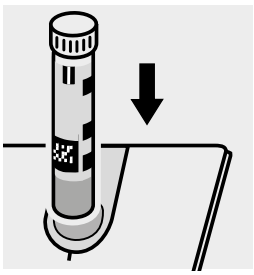
Add 1 level blue micro-spoon of **K-2K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.



Reaction time:
5 minutes



Place the cell **without re-shaking** into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

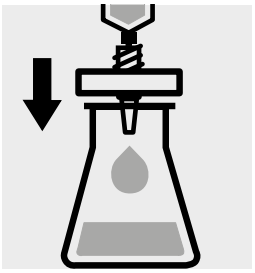
To check the measurement system (test reagents, measurement device, and handling) ready-to-use potassium standard solution Certipur®, Cat.No. 1.70230, concentration 1000 mg/l K, can be used after diluting accordingly.

Potassium

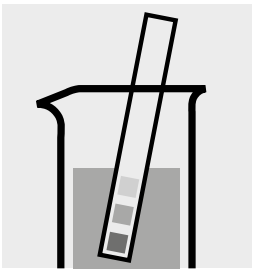
1.00615

Cell Test

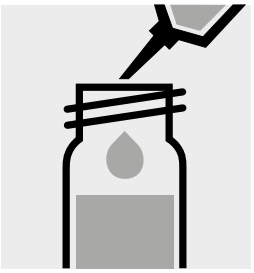
Measuring range:	30 – 300 mg/l K Expression of results also possible in mmol/l.



Filter turbid samples.

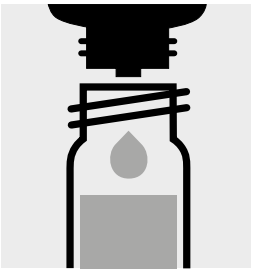


Check the pH of the sample, specified range: pH 3 – 12.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

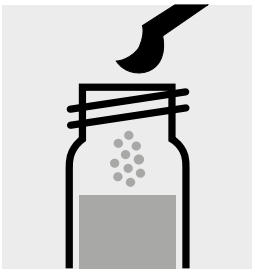


Pipette 0.50 ml of the sample into a reaction cell, close with the screw cap, and mix.

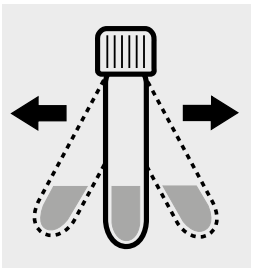
Check the pH, specified range: pH 10.0 – 11.5.



Add 6 drops of **K-1K**, close the cell with the screw cap, and mix.

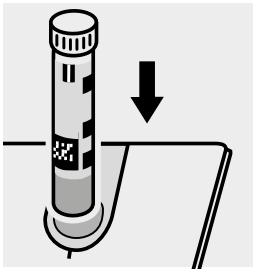


Add 1 level blue micro-spoon of **K-2K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
5 minutes



Place the cell **without re-shaking** into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use potassium standard solution Certipur®, Cat.No. 1.70230, concentration 1000 mg/l K, can be used after diluting accordingly.

Proline

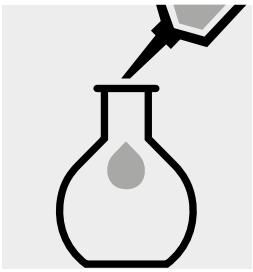
in fruit and vegetable juices

corresponds to **EN 1141** and **German Food and Feed Code §64 LFGB 31.00-7**

Application

Measuring range:	0 – 1200 mg/l	10-mm cell	Method No. 2539
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

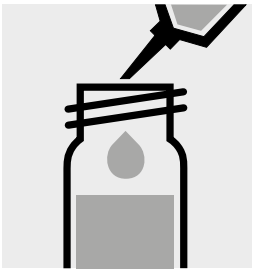
Preparation:



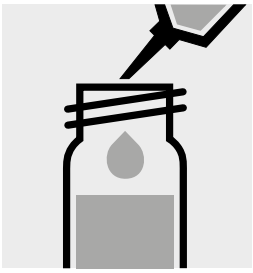
If necessary, dilute the sample with distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended).
Note the dilution ratio (1 + x).

Proline determination:

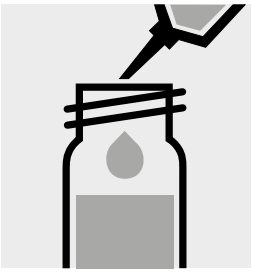
Reagent blank



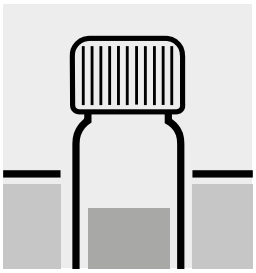
Pipette 1.0 ml of pretreated sample into a test tube with screw cap.



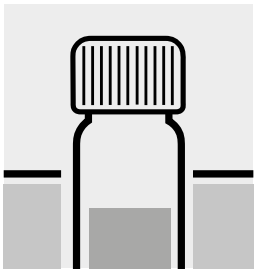
Add 1.0 ml of **formic acid**.



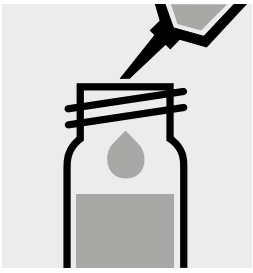
Add 2.0 ml of **ethylene glycol monomethyl ether**, close the test tube with the screw cap, and mix.



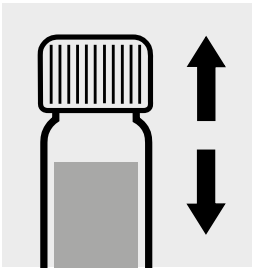
Incubate the test tube in a water bath acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].



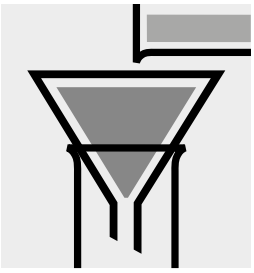
Cool the test tube acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].



Add 10 ml of **n-butyl acetate** and close the test tube with the screw cap.



Extract the color complex into the organic phase acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].

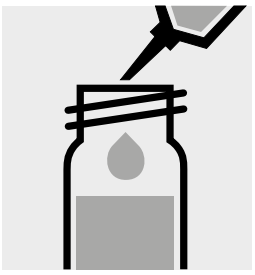


Filter the entire mixture over a hydrophobic filter acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2]: **reagent blank**.

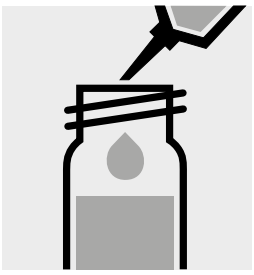
Proline
in fruit and vegetable juices
corresponds to **EN 1141** and **German Food and Feed Code §64 LFGB 31.00-7**

Application

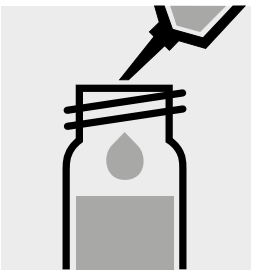
Proline determination:
Measurement sample



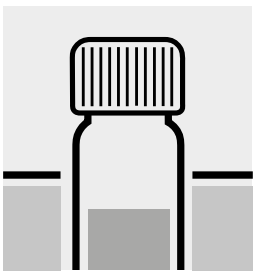
Pipette 1.0 ml of pre-treated sample into a test tube with screw cap.



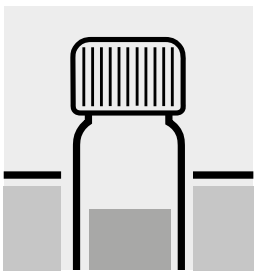
Add 1.0 ml of **formic acid**.



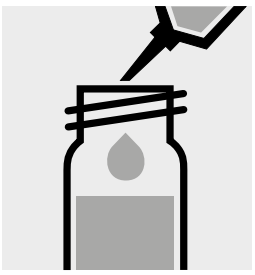
Add 2.0 ml of **ninhydrin solution**, close the test tube with the screw cap, and mix.



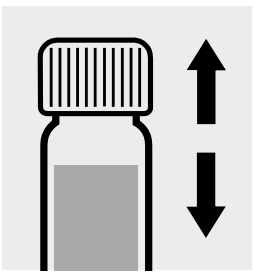
Incubate the test tube in a water bath acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].



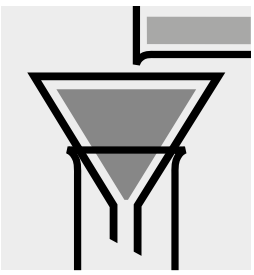
Cool the test tube acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].



Add 10 ml of **n-butyl acetate** and close the test tube with the screw cap.



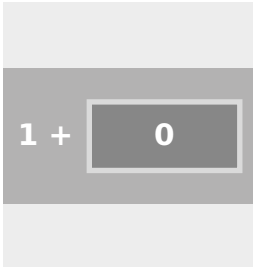
Extract the color complex into the organic phase acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2].



Filter the entire mixture over a hydrophobic filter acc. to EN 1141 [1] or §64 LFGB 31.00-7 [2]: **measurement sample**.

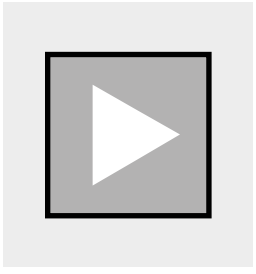
Measurement:

Select method no. **2539**. Perform the zero adjustment and confirm by pressing the <OK> button.

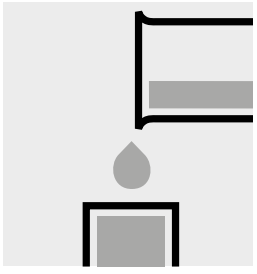


Enter the dilution ratio (1 part of sample + x parts of distilled water).

Confirm with <OK>.



Tap the <Start> button.



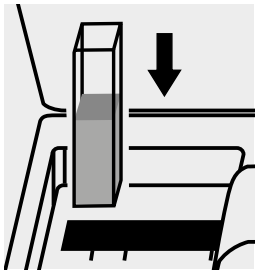
Transfer the solution **"reagent blank"** into the cell.

Proline

in fruit and vegetable juices

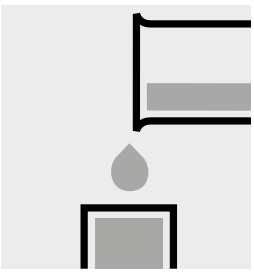
corresponds to **EN 1141** and **German Food and Feed Code §64 LFGB 31.00-7**

Application

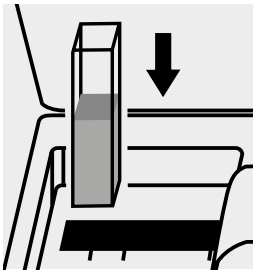


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.



Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.

Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

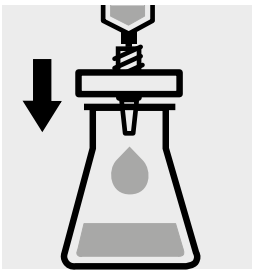
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Protein (BCA method)

Application

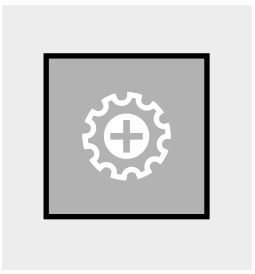
Measuring range:	200 – 1000 µl/ml protein (as bovine serum albumin)	10-mm cell	Method No. 319
Attention!	**A separate calibration must be made for each measurement series (see application instructions)!**		
	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		



Filter turbid samples.

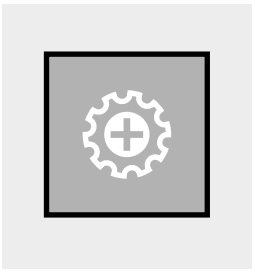
Select method no. **319**.
Perform the zero adjustment and confirm by pressing the <OK> button.

Prepare the measurement solution, the reagent blank solution, and the standard solutions acc. to the package leaflet for "Bicinchonic Acid Protein Assay Kit, Item BCA1 - Procedure A, Steps 1 - 6".

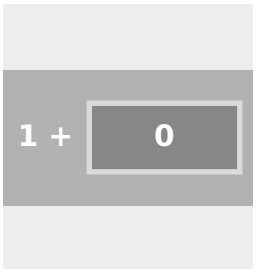


A separate calibration must be made for each measurement series!
Tap the <Settings> button.
Select "Recalibration" and proceed acc. to the application instructions.

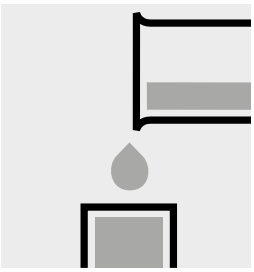
Confirm with <OK>.



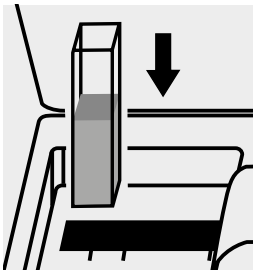
If solutions have been diluted:
Tap the <Settings> button.
Select "Dilution", and proceed acc. to the application instructions.



Enter the dilution ratio (1 part of sample + x parts of distilled water).



Transfer the **measurement sample** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

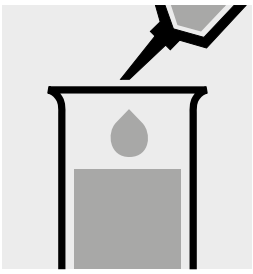
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Protein (Biuret method) Low Range

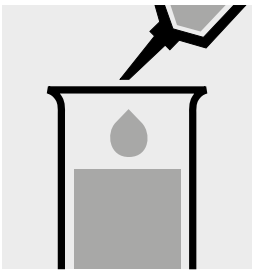
Application

Measuring range:	0.5 – 5.0 g/l protein (as bovine serum albumin)	10-mm plastic cell	Method No. 315
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Reagent blank:



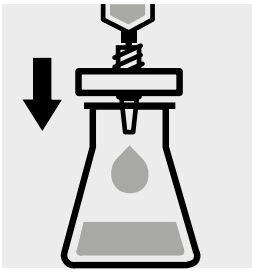
Pipette 0.5 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a plastic vessel.



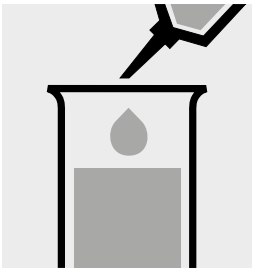
Add 2.0 ml of **Biuret reagent solution** with pipette and mix.

Reaction time: 30 minutes: **reagent blank**

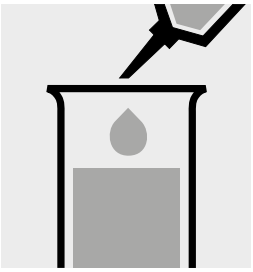
Measurement sample:



Filter or centrifuge turbid samples.



Pipette 0.5 ml of sample into a plastic vessel.



Add 2.0 ml of **Biuret reagent solution** with pipette and mix.

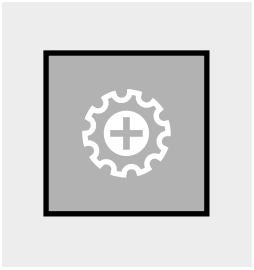
Reaction time: 30 minutes: **measurement sample**

Protein (Biuret method) Low Range

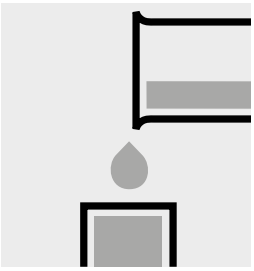
Application

Measurement:

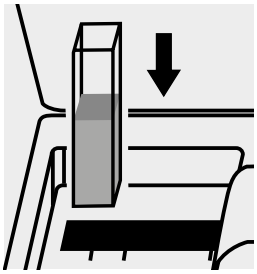
Select method no. **315**.
Perform the zero adjustment and confirm by pressing the <OK> button.



Tap the <Settings> button.
Select "Reagent blank".

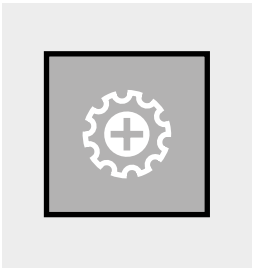


Transfer the solution **"reagent blank"** into the plastic cell.

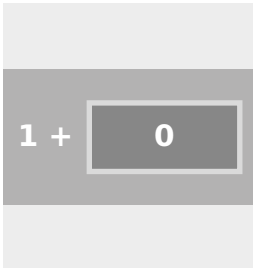


Place the cell into the cell compartment.
The blank measurement is performed automatically.

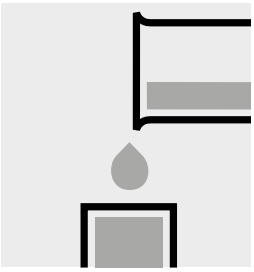
Confirm with <OK>.



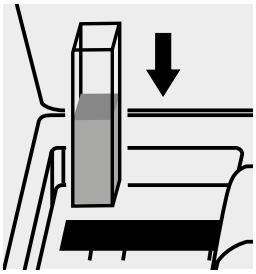
If solutions have been diluted:
Tap the <Settings> button.
Select "Dilution", and proceed acc. to the application instructions.



Enter the dilution ratio (1 part of sample + x parts of distilled water).



Transfer the solution **"measurement sample"** into the plastic cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

With each new batch of the test kit, the pre-programmed calibration must be checked using standard solutions (see section “Calibration”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

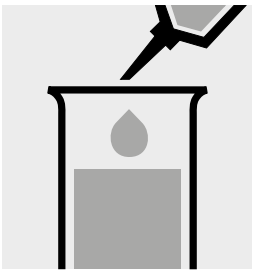
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Protein (Biuret method) High Range

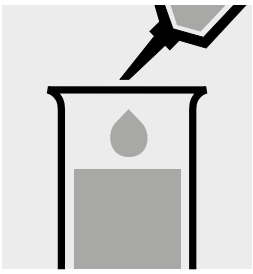
Application

Measuring range:	1 – 10 g/l protein (as bovine serum albumin)	10-mm plastic cell	Method No. 316
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Reagent blank:



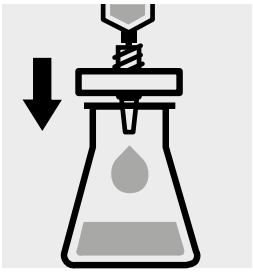
Pipette 1.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a plastic vessel.



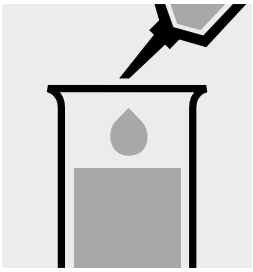
Add 2.0 ml of **Biuret reagent solution** with pipette and mix.

Reaction time:
30 minutes:
reagent blank

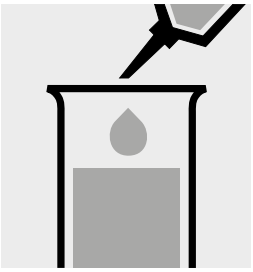
Measurement sample:



Filter or centrifuge turbid samples.



Pipette 1.0 ml of sample into a plastic vessel.



Add 2.0 ml of **Biuret reagent solution** with pipette and mix.

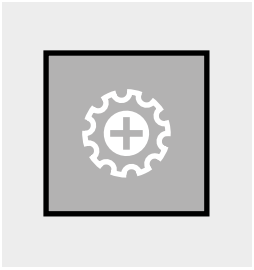
Reaction time:
30 minutes:
measurement sample

Protein (Biuret method) High Range

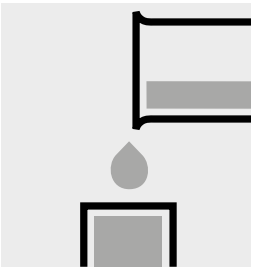
Application

Measurement:

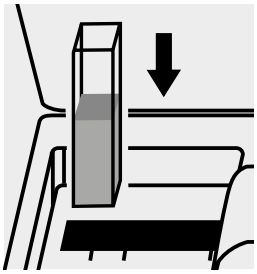
Select method no. **316**.
Perform the zero adjustment and confirm by pressing the <OK> button.



Tap the <Settings> button.
Select "Reagent blank".

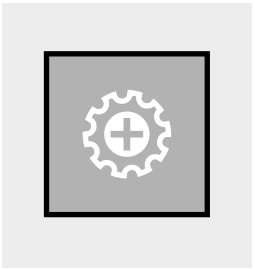


Transfer the solution **"reagent blank"** into the plastic cell.

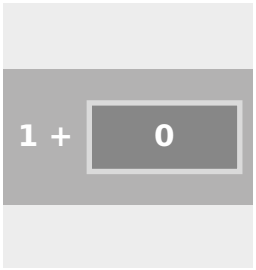


Place the cell into the cell compartment.
The blank measurement is performed automatically.

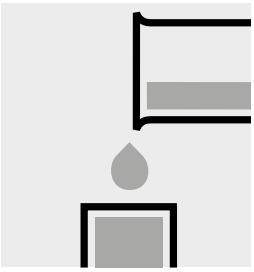
Confirm with <OK>.



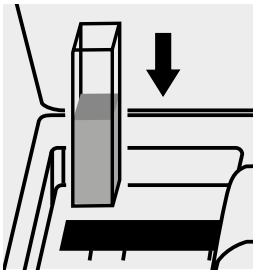
If solutions have been diluted:
Tap the <Settings> button.
Select "Dilution", and proceed acc. to the application instructions.



Enter the dilution ratio (1 part of sample + x parts of distilled water).



Transfer the solution **"measurement sample"** into the plastic cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

With each new batch of the test kit, the pre-programmed calibration must be checked using standard solutions (see section “Calibration”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

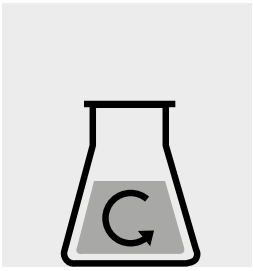
Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Protein (OD280)

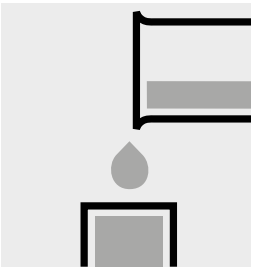
Application

Measuring range:	-0.020 – 2.000 OD_{280}	10-mm quartz cell	Method No. 312
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

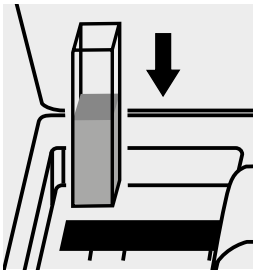


Homogenize the sample **carefully**: **measurement sample**.

Select method no. **312**. Perform the zero adjustment and confirm by pressing the <OK> button.



Transfer the **measurement sample** into the quartz cell.



Place the cell into the cell compartment. The measurement is performed automatically.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Residual Hardness

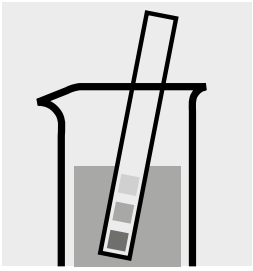
1.14683

Cell Test

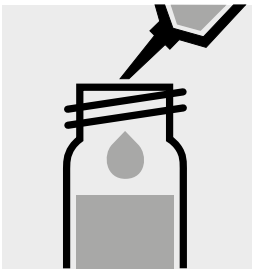
Measuring range:	0.50 – 5.00	mg/l Ca	
	0.070 – 0.700	°d	
	0.087 – 0.874	°e	
	0.12 – 1.25	°f	

Measuring range:	0.70 – 7.00	mg/l CaO
	1.2 – 12.5	mg/l $CaCO_3$

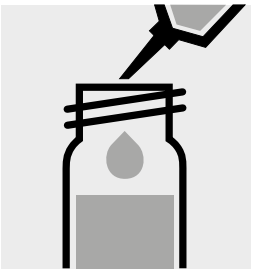
Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 5–8.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

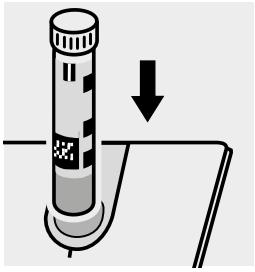


Pipette 4.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 0.20 ml of **RH-1K**, close the cell with the screw cap, and mix.

Reaction time:
10 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

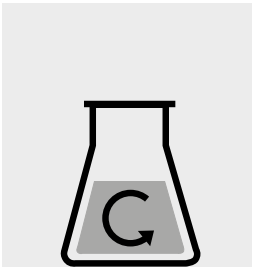
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use calcium standard solution Certipur®, Cat.No. 1.19778, concentration 1000 mg/l Ca, can be used after diluting accordingly. (Pay attention to pH value!)

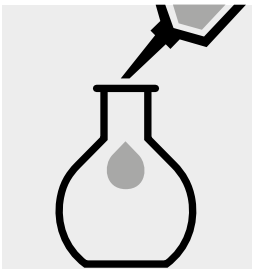
RNA
in purified solutions

Application

Measuring range:	4 – 30 000 µg/ml RNA	10-mm quartz cell	Method No. 2510
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from sample solvent, is recommended. This zero value remains valid until the method is exited.		

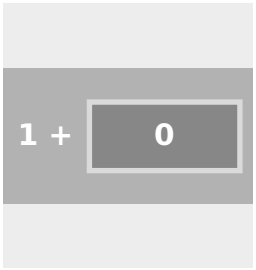


Homogenize the sample **carefully**.



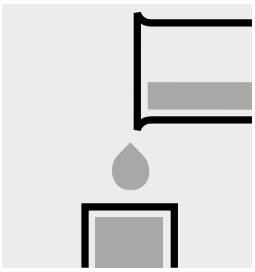
If necessary, dilute the sample.
Note the dilution ratio (1 + x): measurement sample.

Select method no. **2510**. Perform the zero adjustment with sample solvent and confirm by pressing the <OK> button.

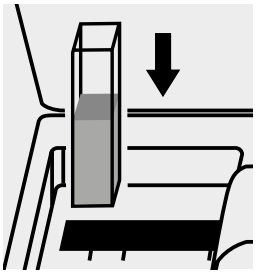


Enter the dilution ratio (1 part of sample + x parts of sample solvent).

Confirm with <OK>.

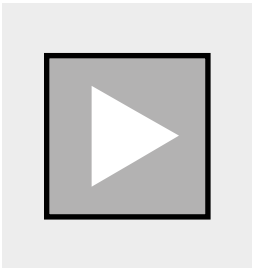


Transfer the **measurement sample** into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

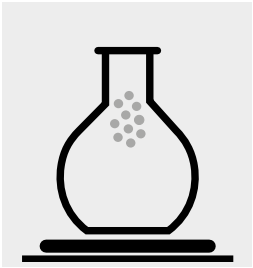
Saccharine

in table-top sweeteners

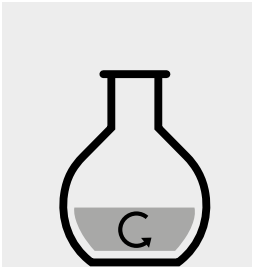
corresponds to **EN 1376** and **German Food and Feed Code §64 LFGB 57.22.99-2**

Application

Measuring range:	0,0 – 1200,0 mg/g	10-mm quartz cell	Method No. 2536
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

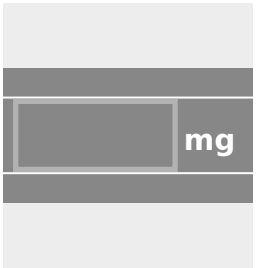


Weigh pulverized sample into a volumetric flask, accurately weighed to 0.1 mg.

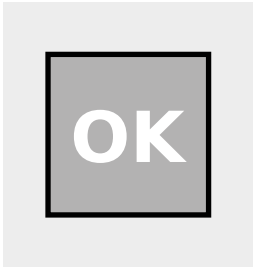


Dissolve the sample acc. to EN 1376 [1] or §64 LFGB 57.22.99-2 [2].

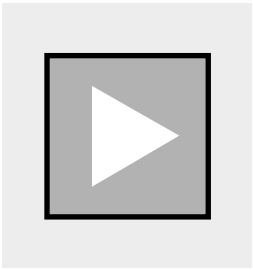
Select method no. **2536**. Perform the zero adjustment and confirm by pressing the <OK> button.



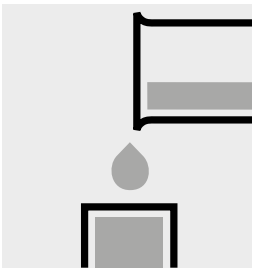
Enter the sample weight in milligrams.



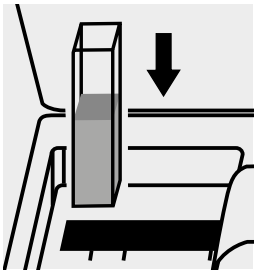
Confirm with <OK>.



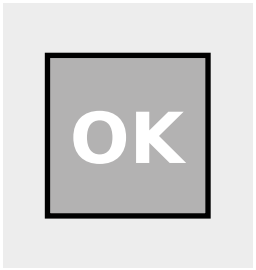
Tap the <Start> button.



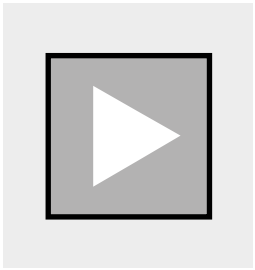
Transfer the solution into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.



Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

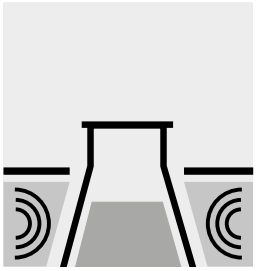
Saybolt Color Measurement

Application

analogous to **ASTM D6045**

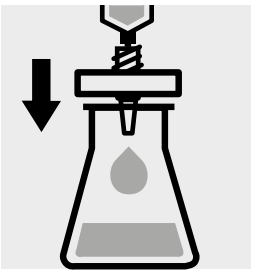
Measuring range:	-15 – 30 Saybolt Color	50-mm cell	Method No. 2563
	-15 – 30 Saybolt Color	100-mm cell	Method No. 2564
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended. This zero value remains valid until the method is exited.		

Preparation:



Contains the sample air or gas bubbles: degassing in ultrasonic bath.

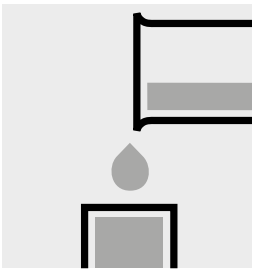
Melt solid samples and homogenize.



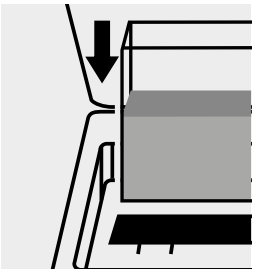
Filter or centrifuge turbid samples.

Determination:

Select method no. **2563** or **2564**.
Perform the zero adjustment and confirm by pressing the <OK> button.

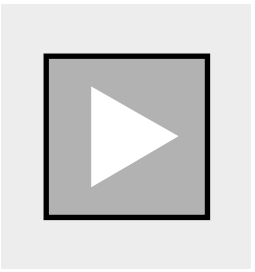


Transfer the solution into a corresponding cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
Saybolt Color is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Note:

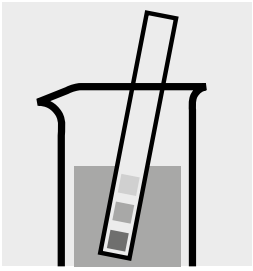
When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

Silicate (Silicic Acid)

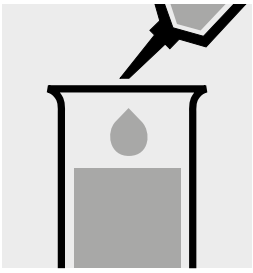
1.14794

Test

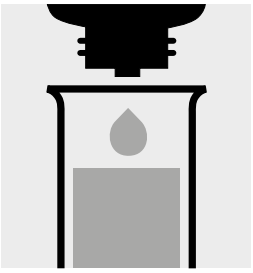
Measuring	0.21 – 10.70 mg/l SiO_2	0.10 – 5.00 mg/l Si	10-mm cell
range:	0.11 – 5.35 mg/l SiO_2	0.05 – 2.50 mg/l Si	20-mm cell
	0.011 – 1.600 mg/l SiO_2	0.005 – 0.750 mg/l Si	50-mm cell
	Expression of results also possible in mmol/l.		



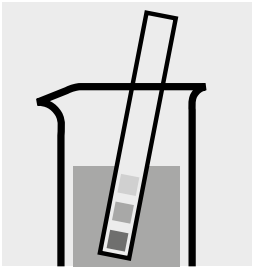
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a test tube.

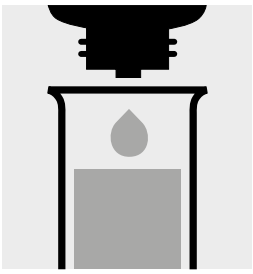


Add 3 drops of **Si-1** and mix.

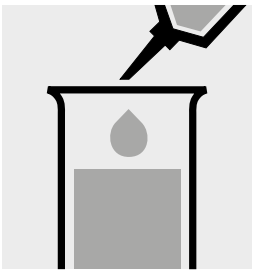


Check the pH, specified range: pH 1.2 – 1.6.

Reaction time: 3 minutes

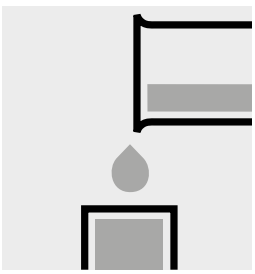


Add 3 drops of **Si-2** and mix.

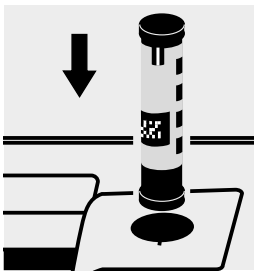


Add 0.50 ml of **Si-3** with pipette and mix.

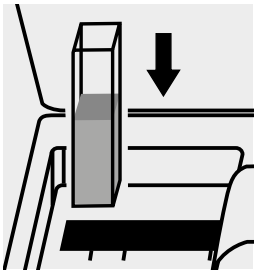
Reaction time: 10 minutes



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use silicon standard solution Certipur®, Cat.No. 1.70236, concentration 1000 mg/l Si, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32243, 1.32244, and 1.32245.
(Attention! Do **not** store standard solutions in glass vessels - see section "Standard solutions"!)

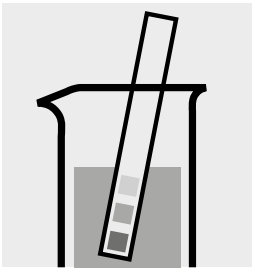
Silicate (Silicic Acid)

1.00857

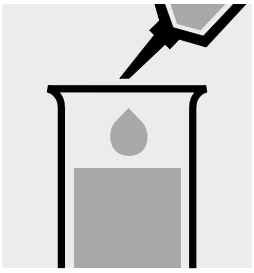
Test

Measuring range:	1.1 – 107.0 mg/l SiO_2	0.5 – 50.0 mg/l Si	10-mm cell
	11 – 1070 mg/l SiO_2	5 – 500 mg/l Si	10-mm cell
	Expression of results also possible in mmol/l.		

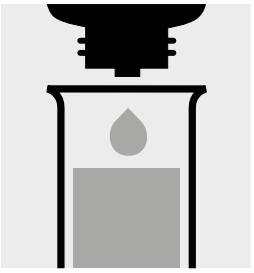
Measuring range: 1.1 – 107.0 mg/l SiO_2



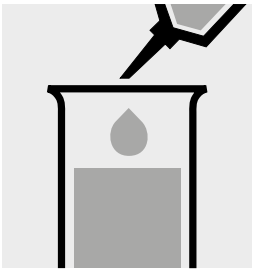
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 4.0 ml of the sample into a test tube.

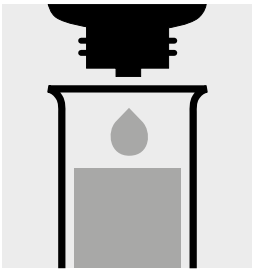


Add 4 drops of **Si-1** and mix.

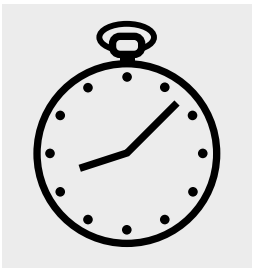


Add 2.0 ml of **Si-2** with pipette and mix.

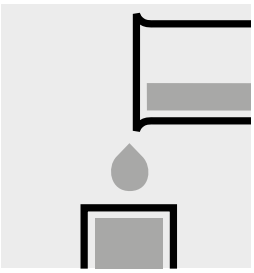
Reaction time:
2 minutes



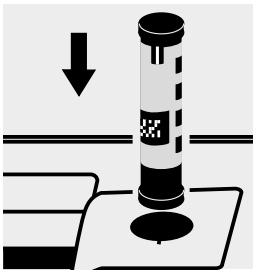
Add 4 drops of **Si-3** and mix.



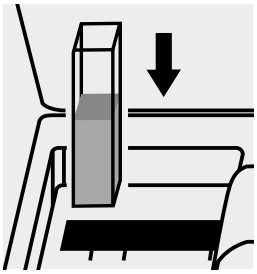
Reaction time:
2 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 0.5 – 50.0 mg/l Si.

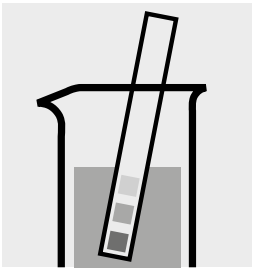


Place the cell into the cell compartment.

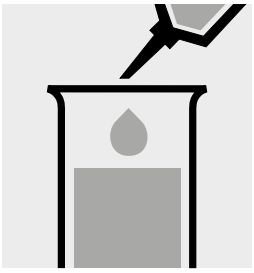
Silicate (Silicic Acid) 1.00857

Test

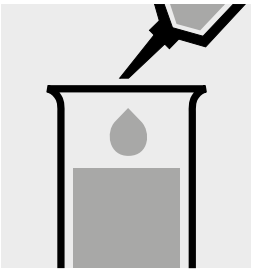
Measuring range: 11 – 1070 mg/l SiO_2



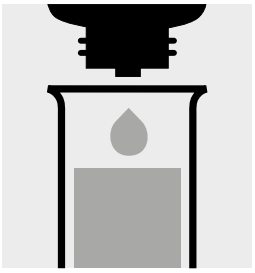
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



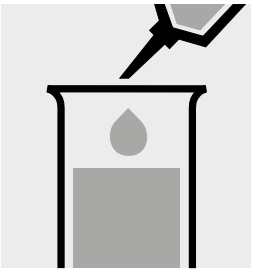
Pipette 5.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a test tube.



Add 0.50 ml of the sample with pipette and mix.

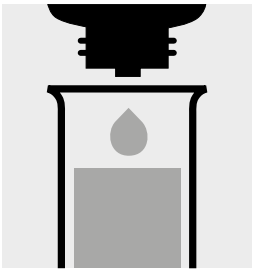


Add 4 drops of **Si-1** and mix.



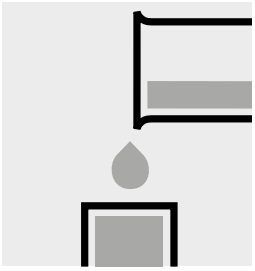
Add 2.0 ml of **Si-2** with pipette and mix.

Reaction time:
2 minutes

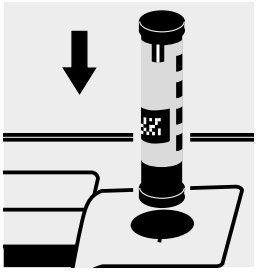


Add 4 drops of **Si-3** and mix.

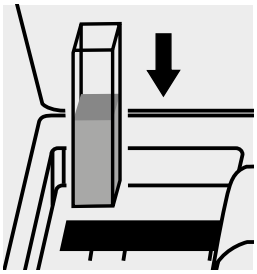
Reaction time:
2 minutes



Transfer the solution into a cell.



Select method with AutoSelector measuring range 5 – 500 mg/l Si.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use silicon standard solution Certipur®, Cat.No. 1.70236, concentration 1000 mg/l Si, can be used after diluting accordingly. (Attention! Do **not** store standard solutions in glass vessels - see section "Standard solutions"!)

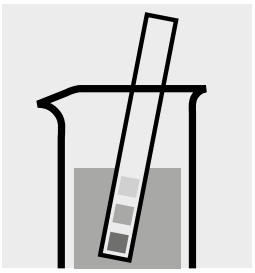
Silicate (Silicic Acid)

1.01813

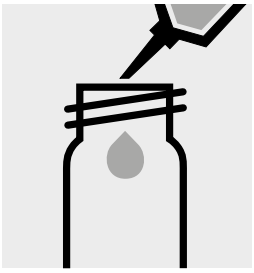
Test

Measuring	0.5 – 500.0 µg/l SiO_2	0.2 – 233.7 µg/l Si	50-mm cell
range:	0.25 – 250.00 µg/l SiO_2	0.12 – 116.85 µg/l Si	100-mm cell
	Expression of results also possible in mmol/l.		

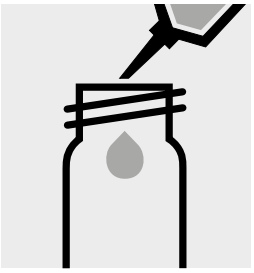
Measuring range: 0.5 – 500.0 µg/l SiO_2



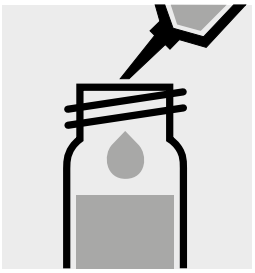
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



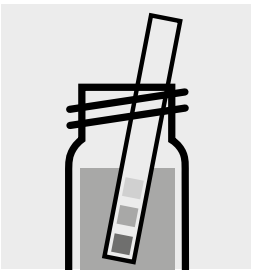
Pipette 10 ml of the sample into a plastic vessel (**Flat-bottomed tubes, Cat.No. 1.17988**).



Pipette 10 ml of distilled water (Water Ultrapur, Cat.No. 1.01262, is recommended) into a second plastic vessel (**Flat-bottomed tubes, Cat. No. 1.17988**).
(Blank)

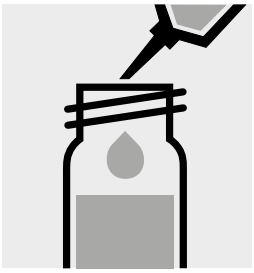


Add to each vessel 0.10 ml of **Si-1** with pipette, close with the screw cap, and mix.

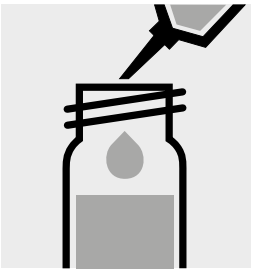


Check the pH, specified range: pH 1.2 – 1.6.

Reaction time:
5 minutes

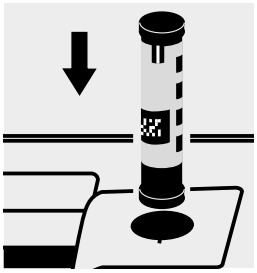


Add to each vessel 0.10 ml of **Si-2** with pipette, close with the screw cap, and mix.

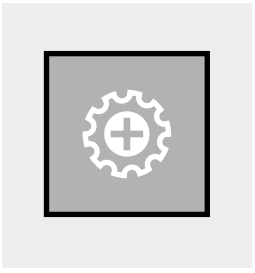


Add to each vessel 0.50 ml of **Si-3** with pipette, close with the screw cap, and mix.

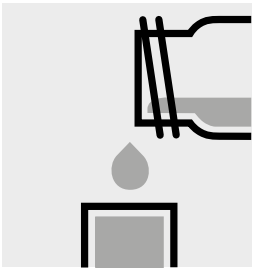
Reaction time:
5 minutes



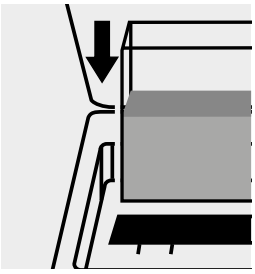
Select method with AutoSelector.



Tap the <Settings> button.
Select "Reagent blank".

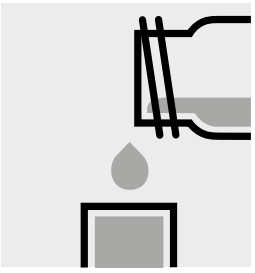


Transfer the blank into the cell and measure **immediately**.

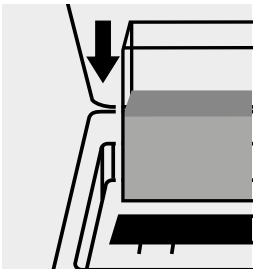


Insert the blank cell into the cell compartment.

Select "User RB".
Confirm with <OK>.



Transfer the measurement sample into the cell and measure **immediately**.

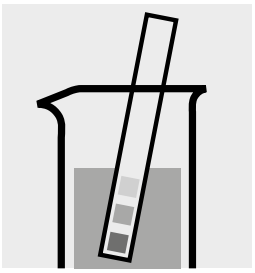


Insert the cell containing the sample into the cell compartment.

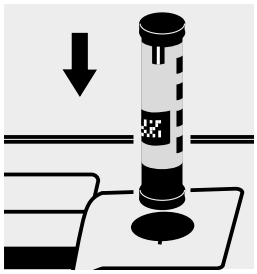
Silicate (Silicic Acid) 1.01813

Test

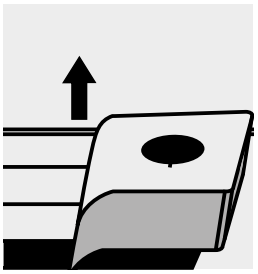
Measuring range: 0.25 – 250.00 µg/l SiO_2



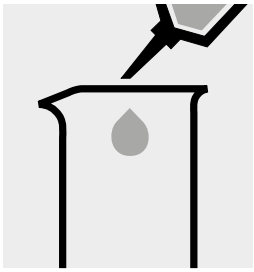
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



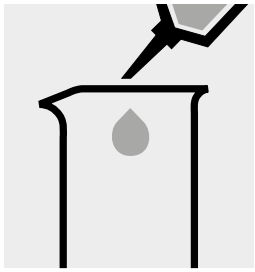
Select method with AutoSelector.



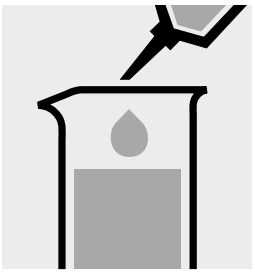
Remove the round-cell holder.



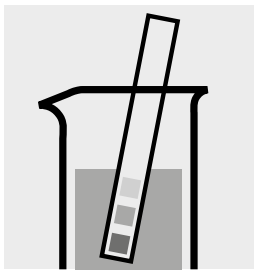
Place 20 ml of sample into a plastic vessel.



Place 20 ml of distilled water (Water Ultrapur, Cat.No. 1.01262, is recommended) into a second plastic vessel. (Blank)

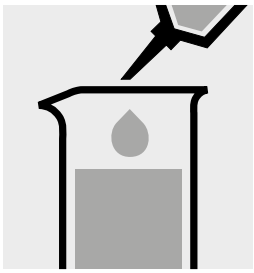


Add to each vessel 0.20 ml of **Si-1** with pipette and mix.

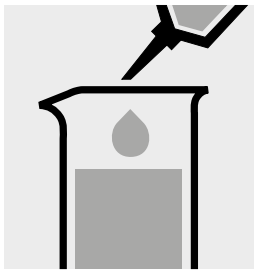


Check the pH, specified range: pH 1.2 – 1.6.

Reaction time:
5 minutes

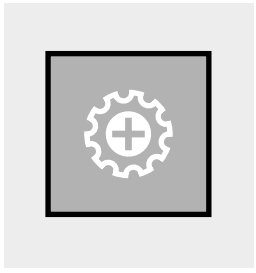


Add 0.20 ml of **Si-2** with pipette and mix.

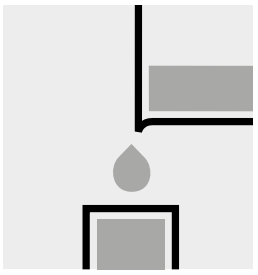


Add to each vessel 1.0 ml of **Si-3** with pipette and mix.

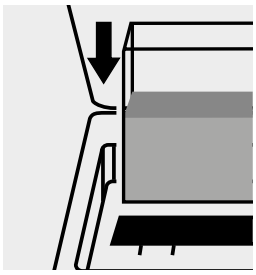
Reaction time:
5 minutes



Tap the <Settings> button.
Select "Reagent blank".

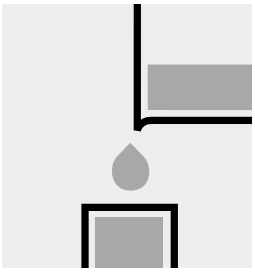


Transfer the blank into the cell and measure **immediately**.

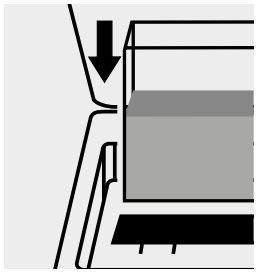


Insert the blank cell into the cell compartment.

Select "User RB".
Confirm with <OK>.



Transfer the measurement sample into the cell and measure **immediately**.



Insert the cell containing the sample into the cell compartment.

Important:

No glass equipment may be used in the course of the determination (e. g. pipettes etc.)!

Quality assurance:

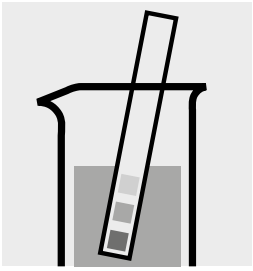
To check the measurement system (test reagents, measurement device, and handling) ready-to-use silicon standard solution Certipur®, Cat.No. 1.70236, concentration 1000 mg/l Si, can be used after diluting accordingly as well as the Standard solution for photometric applications, Cat.No. 1.32244. (Attention! Do **not** store standard solutions in glass vessels - see section "Standard solutions").

Silver

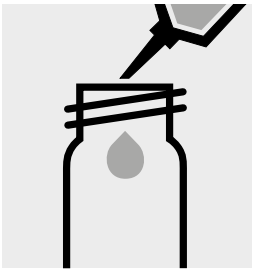
1.14831

Test

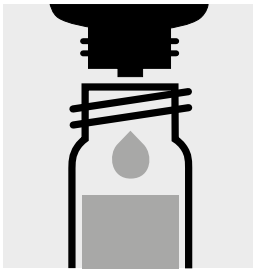
Measuring range:	0.50 – 3.00 mg/l Ag	10-mm cell
	0.25 – 1.50 mg/l Ag	20-mm cell
	Expression of results also possible in mmol/l.	



Check the pH of the sample, specified range: pH 4– 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

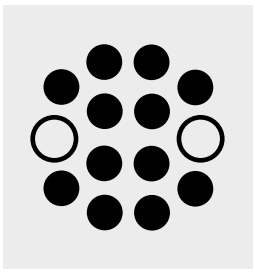


Pipette 10 ml of the sample into an empty round cell (Empty cells, Cat.No. 1.14724).

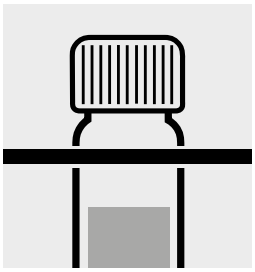


Add 2 drops of **Ag-1.**

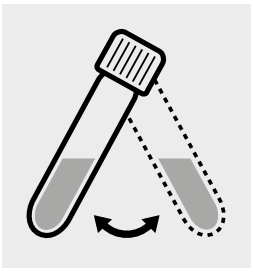
Add 1 level green micro-spoon of **Ag-2**, close the cell with the screw cap.



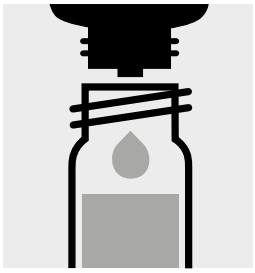
Heat the cell in the thermoreactor at 120 °C for 1 hours.



Remove the cell from the thermoreactor and place in a test-tube rack to cool to room temperature.

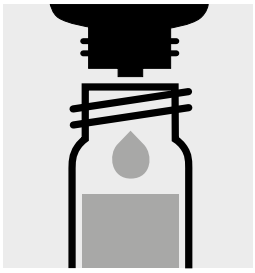


Swirl the cell before opening.

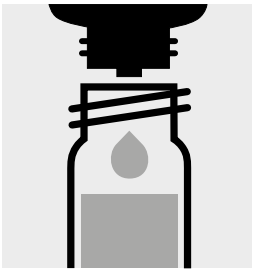


Add 3 drops of **Ag-3**, close with the screw cap, and mix.

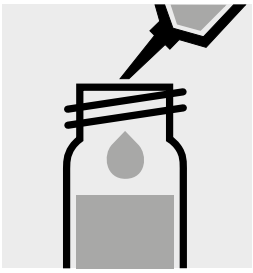
Check the pH, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Add 1 drop of **Ag-4**, close with the screw cap, and mix.

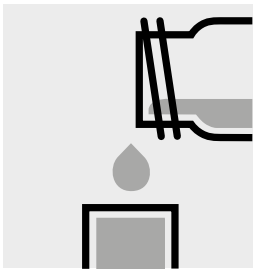


Add 5 drops of **Ag-5**, close with the screw cap, and mix.

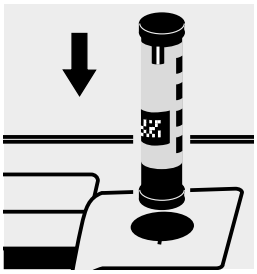


Add 1.0 ml of **Ag-6**, close with the screw cap, and mix.

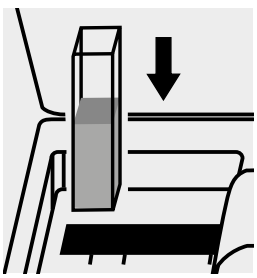
Reaction time: 5 minutes



Transfer the solution into a corresponding rectangular cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

Very high silver concentrations in the sample produce turbid solutions (measurement solution should be clear). In such cases the sample must be diluted (plausibility check).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) ready-to-use silver standard solution Certipur®, Cat.No. 1.19797, concentration 1000 mg/l Ag, can be used after diluting accordingly.

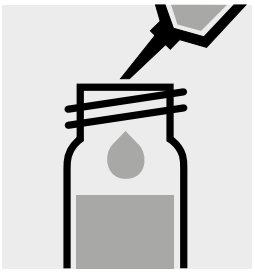
Sodium

in nutrient solutions

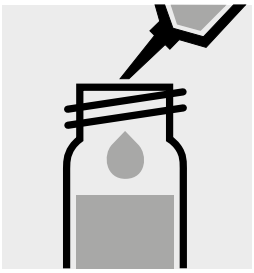
1.00885

Cell Test

Measuring range:	10 – 300 mg/l Na Expression of results also possible in mmol/l.

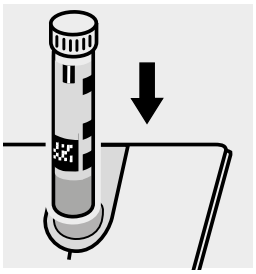


Pipette 0.50 ml of **Na-1K** into a reaction cell and mix.



Add 0.50 ml of the sample with pipette, close the cell with the screw cap, and mix.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

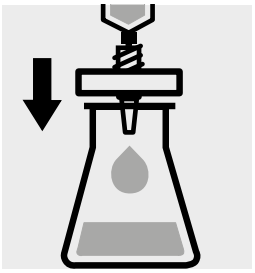
To check the measurement system (test reagents, measurement device, and handling) ready-to-use chloride standard solution Certipur®, Cat.No. 1.19897, concentration 1000 mg/l Cl^- (corresponds to 649 mg/l Na), can be used after diluting accordingly (see section "Standard solutions").

Spectral Absorption Coefficient

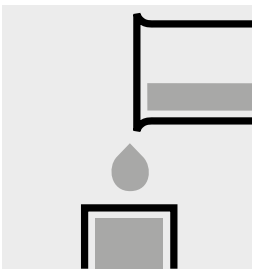
α(254)

analogous to **DIN 38404**

Measuring	1 – 250 m^{-1}	254 nm	10-mm cell	Method No. 300
range:	0.3 – 125.0 m^{-1}	254 nm	20-mm cell	Method No. 300
	0.1 – 50.0 m^{-1}	254 nm	50-mm cell	Method No. 300

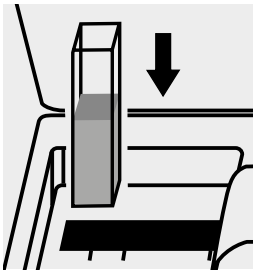


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into a corresponding cell.

Select method no. **300**.



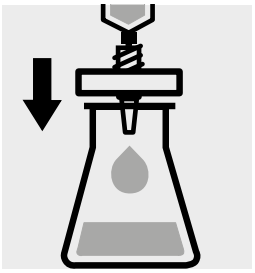
Place the cell into the cell compartment.
The measurement is performed automatically.

Spectral Absorption Coefficient

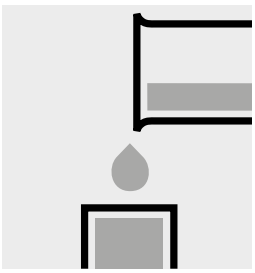
α(436)

analogous to **EN ISO 7887**

Measuring	1 – 250 m^{-1}	436 nm	10-mm cell	Method No. 302
range:	0.3 – 125.0 m^{-1}	436 nm	20-mm cell	Method No. 302
	0.1 – 50.0 m^{-1}	436 nm	50-mm cell	Method No. 302

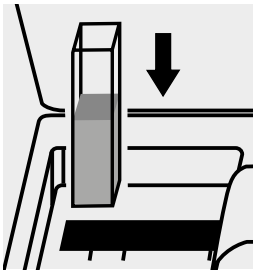


Filter sample solution through a membrane filter with 0.45 µm pore size.



Transfer the solution into a corresponding cell.

Select method no. **302**.



Place the cell into the cell compartment.
The measurement is performed automatically.

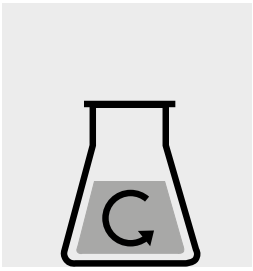
Notes:
Filtered sample = true color.
Unfiltered sample = apparent color.

Spectral Attenuation Coefficient

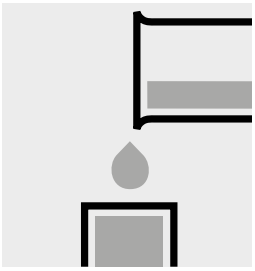
μ(254)

analogous to **DIN 38404**

Measuring	1 – 250 m^{-1}	254 nm	10-mm cell	Method No. 301
range:	0.3 – 125.0 m^{-1}	254 nm	20-mm cell	Method No. 301
	0.1 – 50.0 m^{-1}	254 nm	50-mm cell	Method No. 301

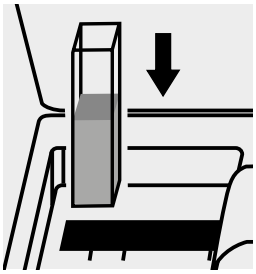


Shake the unfiltered sample solution to evenly suspend the turbidity-causing substances. Do not disperse the contents, **measure immediately**.



Transfer the solution into a corresponding cell.

Select method no. **301**.

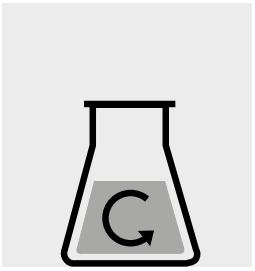


Place the cell into the cell compartment.
The measurement is performed automatically.

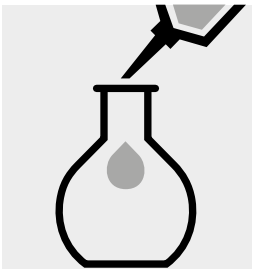
ssDNA
in purified solutions

Application

Measuring range:	3 – 25 000 µg/ml ssDNA	10-mm quartz cell	Method No. 2511
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment prepared from sample solvent, is recommended. This zero value remains valid until the method is exited.		

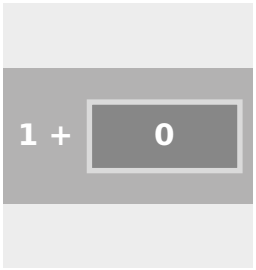


Homogenize the sample **carefully**.



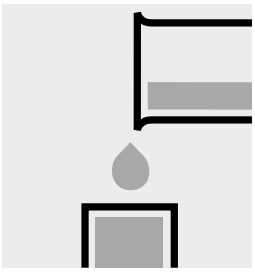
If necessary, dilute the sample.
Note the dilution ratio (1 + x): measurement sample.

Select method no. **2511**. Perform the zero adjustment with sample solvent and confirm by pressing the <OK> button.

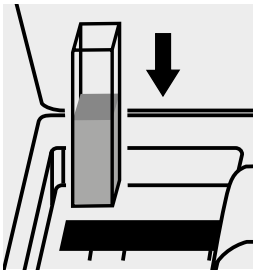


Enter the dilution ratio (1 part of sample + x parts of sample solvent).

Confirm with <OK>.

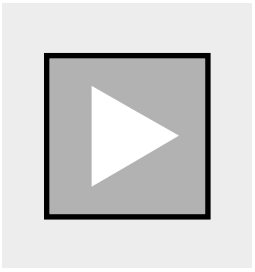


Transfer the **measurement sample** into the quartz cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

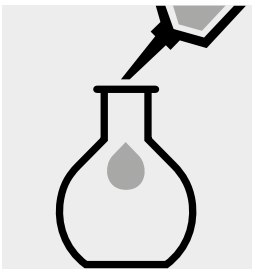
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Sugars
in beverages

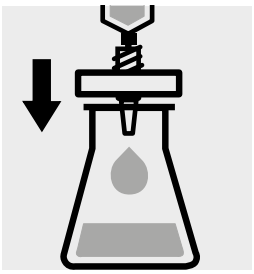
Application

Measuring range:	0 – 200 g/l sugar (calculated as glucose)	50-mm cell	Method No. 314
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from cell-culture medium or diluent, is recommended. This zero value remains		
	valid until the method is exited.		

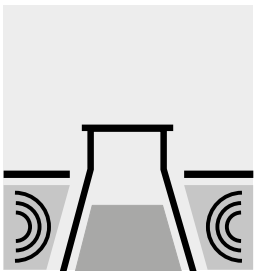
Preparation:



Dilute the sample with distilled water (Water for analysis EMSURE®, Cat. No. 1.16754, is recommended) in the ratio 1:200 (1+199).

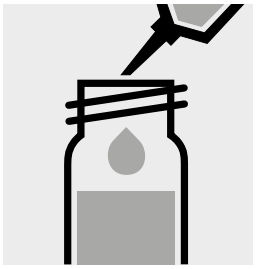


Filter turbid samples.

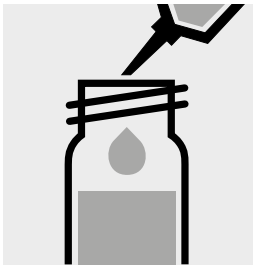


Degas the sample in ultrasonic bath.

Sugar determination:
Reagent blank

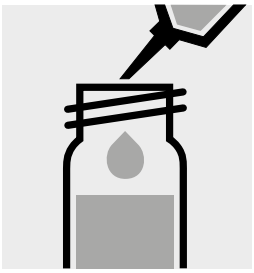


Pipette 2.0 ml of distilled water (Water for analysis EMSURE®, Cat.No. 1.16754, is recommended) into a closable vessel (20 ml).

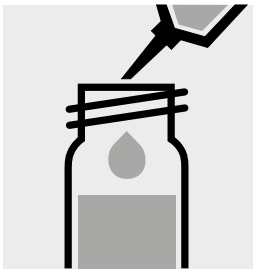


Add 2.0 ml of **hydrochloric acid 6 mol/l** with pipette, close the vessel, and mix.

Temper the vessel in a water bath at 95 ± 5 °C for **exactly** 10 minutes.



Add 8.0 ml of **sodium hydroxide solution 2.5 mol/l** with pipette and mix.



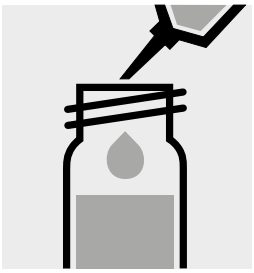
Add 2.0 ml of **DNSA reagent** with pipette, close the vessel, and mix.

Temper the vessel in a water bath at 95 ± 5 °C for **exactly** 5 minutes.

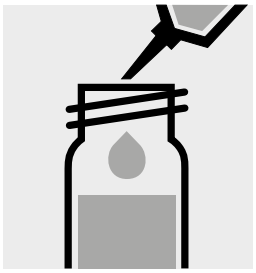
Cool the vessel in an ice bath/water bath for **exactly** 10 minutes.

Sugar determination:
Measurement sample

Reaction time:
10 minutes at room temperature:
reagent blank

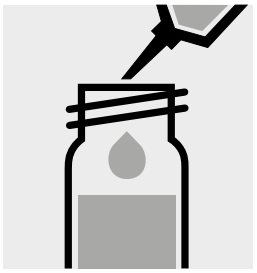


Pipette 2.0 ml of pretreated sample into a closable vessel (20 ml).



Add 2.0 ml of **hydrochloric acid 6 mol/l** with pipette, close the vessel, and mix.

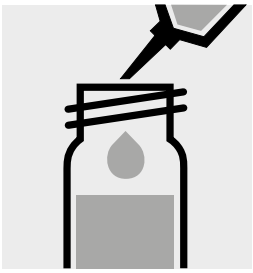
Temper the vessel in a water bath at 95 ± 5 °C for **exactly** 10 minutes.



Add 8.0 ml of **sodium hydroxide solution 2.5 mol/l** with pipette and mix.

Sugars
in beverages

Application



Add 2.0 ml of **DNSA reagent** with pipette, close the vessel, and mix.

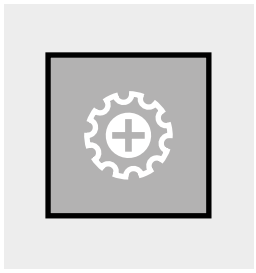
Temper the vessel in a water bath at 95 ± 5 °C for **exactly** 5 minutes.

Cool the vessel in an ice bath/water bath for **exactly** 10 minutes.

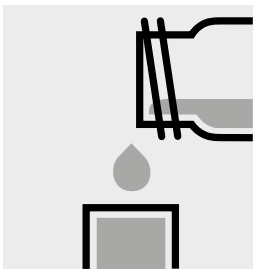
Reaction time:
10 minutes at room temperature:
measurement sample

Measurement:

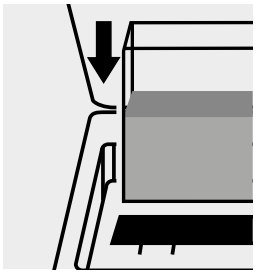
Select method no. **314**. Perform the zero adjustment and confirm by pressing the <OK> button.



Tap the <Settings> button.
Select "Reagent blank".

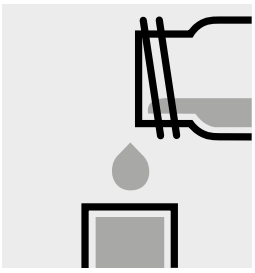


Transfer the solution **"reagent blank"** into the cell.

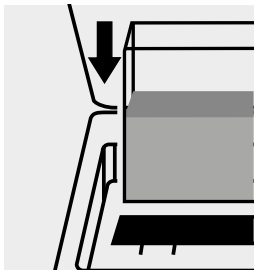


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.



Transfer the solution **"measurement sample"** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Calibration”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

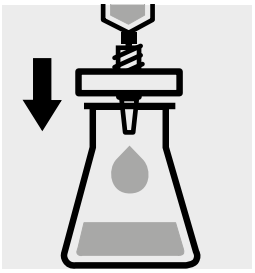
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Sulfate

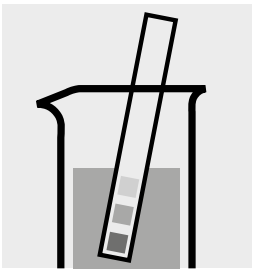
1.02532

Cell Test

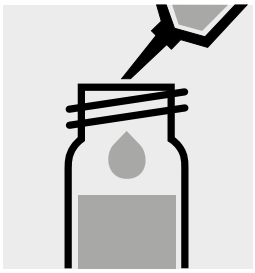
Measuring range:	1.0 – 50.0 mg/l SO_4 Expression of results also possible in mmol/l.



Filter turbid samples.

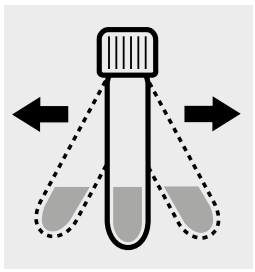


Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



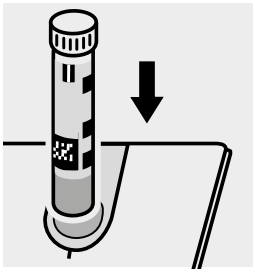
Pipette 10 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level green micro-spoon of **SO_4-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
2 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

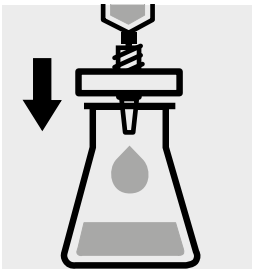
To check the measurement system (test reagents, measurement device, and handling) ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can be used after diluting accordingly.

Sulfate

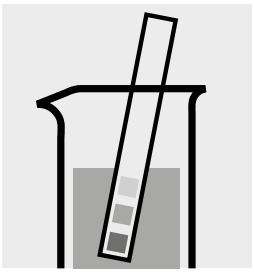
1.14548

Cell Test

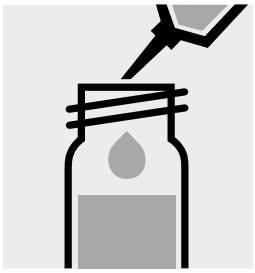
Measuring range:	5 – 250 mg/l SO_4 Expression of results also possible in mmol/l.



Filter turbid samples.

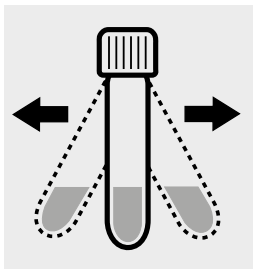


Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



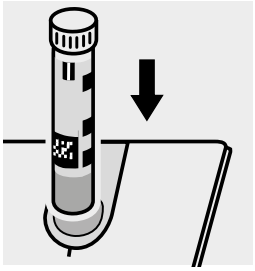
Pipette 5.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level green micro-spoon of **SO_4-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
2 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25050 and 1.25051.

Ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can also be used after diluting accordingly.

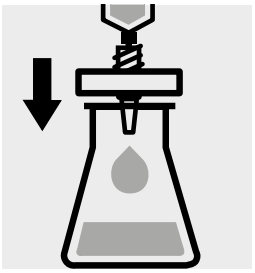
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Sulfate

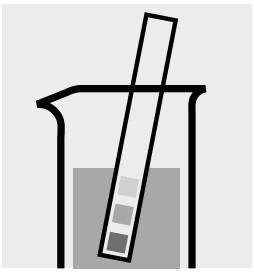
1.00617

Cell Test

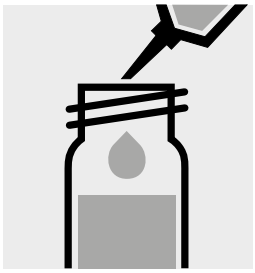
Measuring range:	50 – 500 mg/l SO_4 Expression of results also possible in mmol/l.



Filter turbid samples.

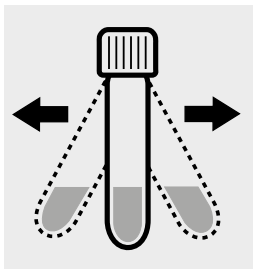


Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



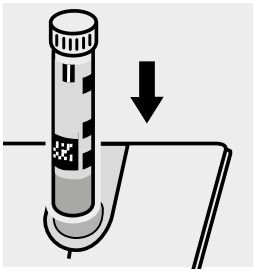
Pipette 2.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level green micro-spoon of **SO_4-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
2 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25051 and 1.25052.

Ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can also be used after diluting accordingly.

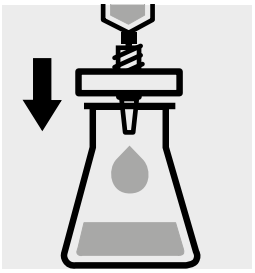
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Sulfate

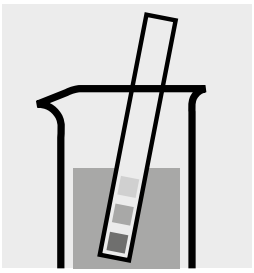
1.14564

Cell Test

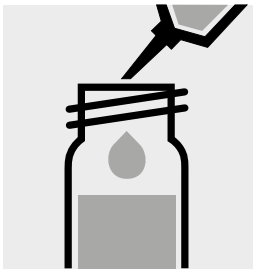
Measuring range:	100 – 1000 mg/l SO_4 Expression of results also possible in mmol/l.



Filter turbid samples.

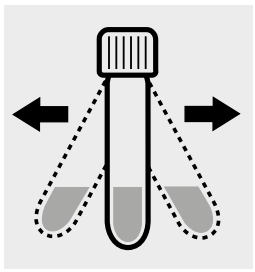


Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



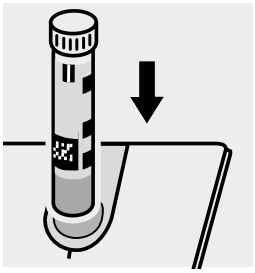
Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.

Add 1 level green micro-spoon of **SO_4-1K**, close the cell with the screw cap.



Shake the cell vigorously to dissolve the solid substance.

Reaction time:
2 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 20, Cat.No. 1.14675, or the Standard solutions for photometric applications, Cat.Nos. 1.25051, 1.25052 and 1.25053.

Ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can also be used after diluting accordingly.

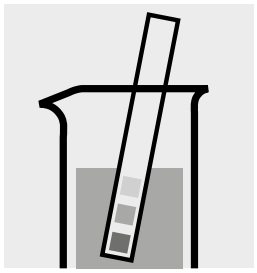
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 20) is highly recommended.

Sulfate

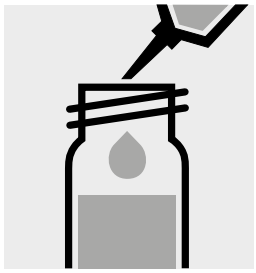
1.14791

Test

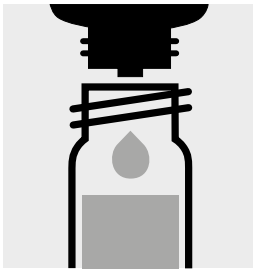
Measuring range:	25 – 300 mg/l SO_4 Expression of results also possible in mmol/l.	10-mm cell



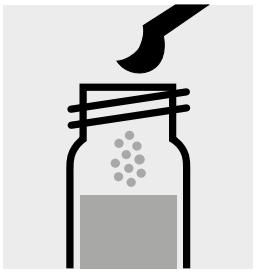
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



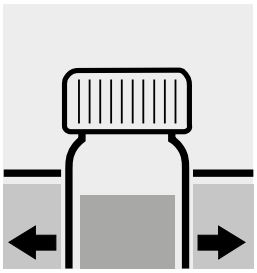
Pipette 2.5 ml of the sample into a test tube with screw cap.



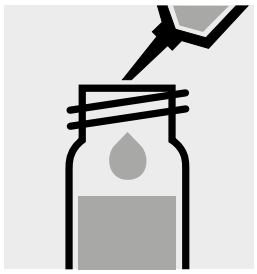
Add 2 drops of **SO_4-1** and mix.



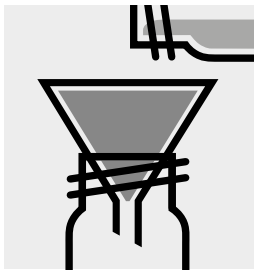
Add 1 level green micro-spoon of **SO_4-2**, close the test tube with the screw cap, and mix.



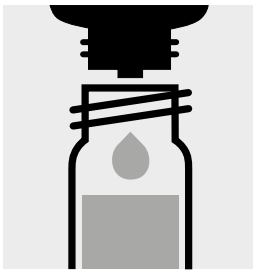
Temper the test tube in a water bath at 40 °C for 5 minutes.



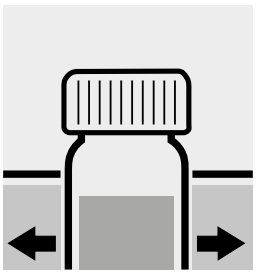
Add 2.5 ml of **SO_4-3** with pipette and mix.



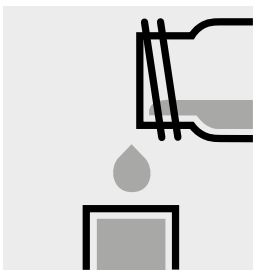
Filter the content of the test tube with a round filter into another test tube with screw cap.



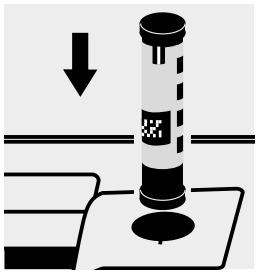
Add 4 drops of **SO_4-4** to the filtrate, close the test tube with the screw cap, and mix.



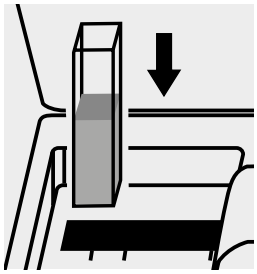
Temper the test tube again in the water bath for 7 minutes.



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25050 and 1.25051.

Ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can also be used after diluting accordingly.

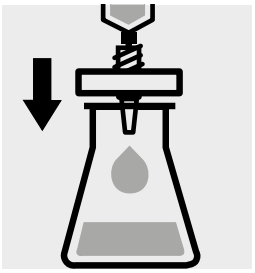
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Sulfate

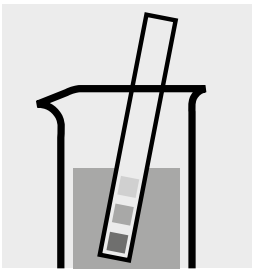
1.01812

Test

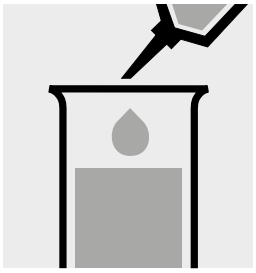
Measuring	2.5 – 50.0	mg/l SO_4	10-mm cell
range:	1.3 – 25.0	mg/l SO_4	20-mm cell
	0.50 – 10.00	mg/l SO_4	50-mm cell
	Expression of results also possible in mmol/l.		



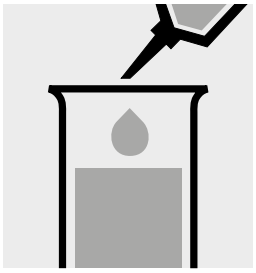
Filter turbid samples.



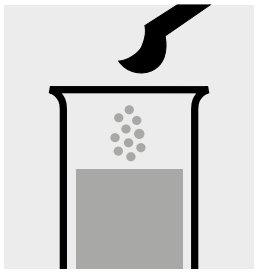
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



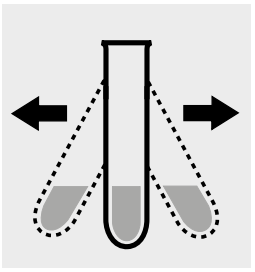
Pipette 0.50 ml of **SO_4-1** into a test tube.



Add 10 ml of the sample with pipette and mix.

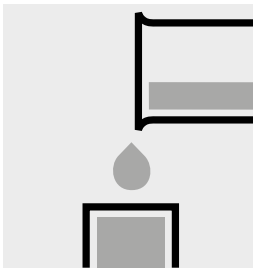


Add 1 level green micro-spoon of **SO_4-2**.

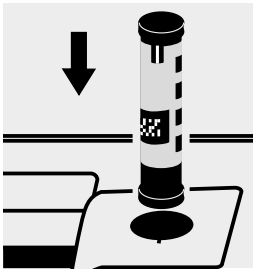


Shake the test tube vigorously to dissolve the solid substance.

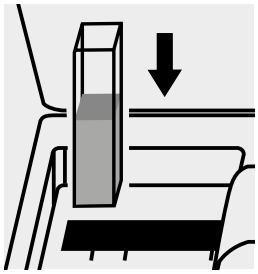
Reaction time:
2 minutes, **measure immediately**.



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

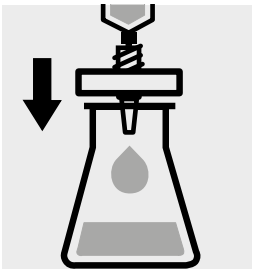
To check the measurement system (test reagents, measurement device, and handling) ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can be used after diluting accordingly.

Sulfate

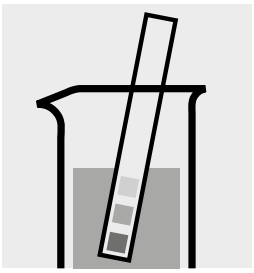
1.02537

Test

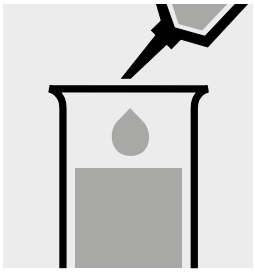
Measuring range:	5 – 300 mg/l SO_4 Expression of results also possible in mmol/l.	10-mm cell



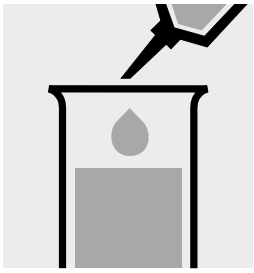
Filter turbid samples.



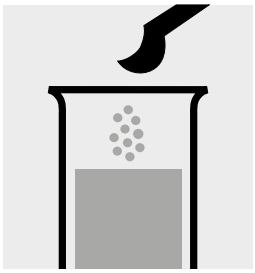
Check the pH of the sample, specified range: pH 2– 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



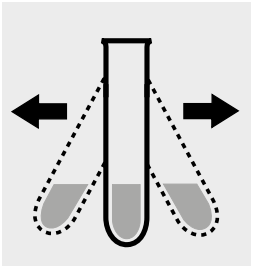
Pipette 0.50 ml of **SO_4-1** into a test tube.



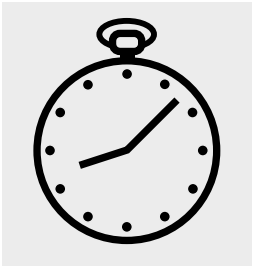
Add 5.0 ml of the sample with pipette and mix.



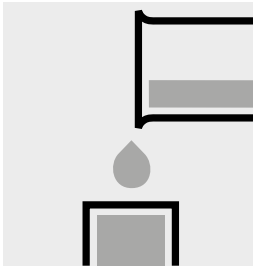
Add 1 level blue microspoon of **SO_4-2**.



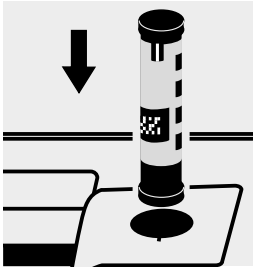
Shake the test tube vigorously to dissolve the solid substance.



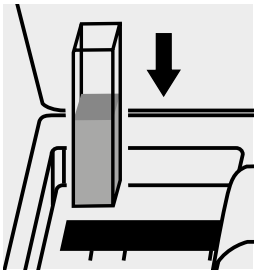
Reaction time:
2 minutes, **measure immediately**.



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Only when selecting the method manually:
For batches with a minimum shelf life **till** 2021/10/31: select method number **230**.
For batches with a minimum shelf life **after** 2021/10/31: select method number **236**.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 10, Cat.No. 1.14676, or the Standard solutions for photometric applications, Cat.Nos. 1.25050 and 1.25051.

Ready-to-use sulfate standard solution Certipur®, Cat.No. 1.19813, concentration 1000 mg/l SO_4^{2-}, can also be used after diluting accordingly.

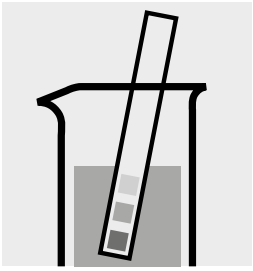
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 10) is highly recommended.

Sulfide

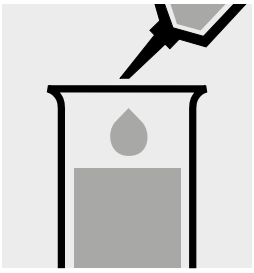
1.14779

Test

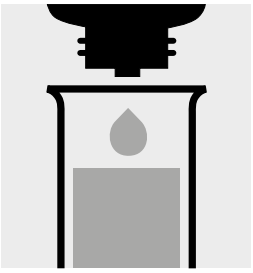
Measuring range:	0.10 – 1.50 mg/l S	0.10 – 1.55 mg/l HS	10-mm cell
	0.050 – 0.750 mg/l S	0.052 – 0.774 mg/l HS	20-mm cell
	0.020 – 0.500 mg/l S	0.021 – 0.516 mg/l HS	50-mm cell
	Expression of results also possible in mmol/l.		



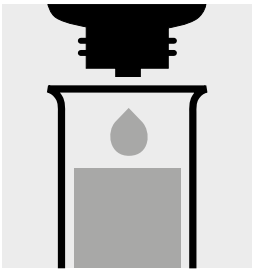
Check the pH of the sample, specified range: pH 2 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



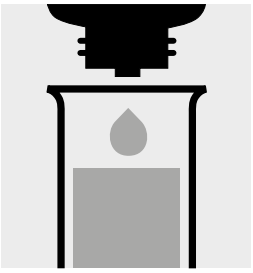
Pipette 5.0 ml of the sample into a test tube.



Add 1 drop of **S-1** and mix.

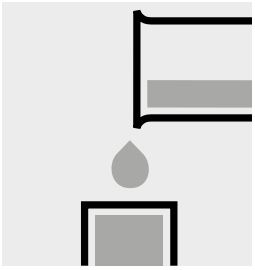


Add 5 drops of **S-2** and mix.

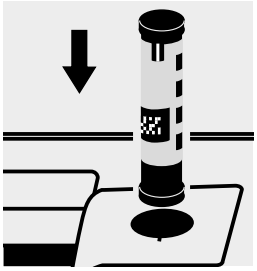


Add 5 drops of **S-3** and mix.

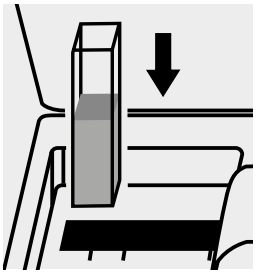
Reaction time:
1 minute



Transfer the solution into a corresponding cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important:

To measure in the 50-mm cell, the sample volume and the volume of the reagents have to be doubled for each. Alternatively, the semi-microcell, Cat.No. 1.73502, can be used.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a sulfide standard solution must be prepared from sodium sulfide GR (see section "Standard solutions").

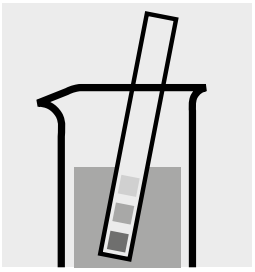
Sulfite

1.14394

Cell Test

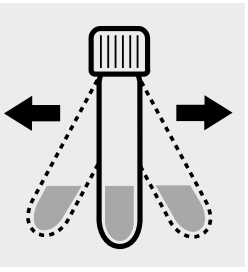
Measuring	1.0 – 20.0 mg/l SO_3	0.8 – 16.0 mg/l SO_2	Round cell
range:	0.05 – 3.00 mg/l SO_3	0.04 – 2.40 mg/l SO_2	50-mm cell
	Expression of results also possible in mmol/l.		

Measuring range: 1.0 – 20.0 mg/l SO_3

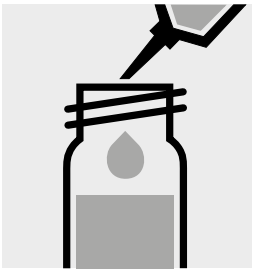


Check the pH of the sample, specified range: pH 4–9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Add 1 level grey micro-spoon of **SO_3-1K** into a reaction cell, close with the screw cap.

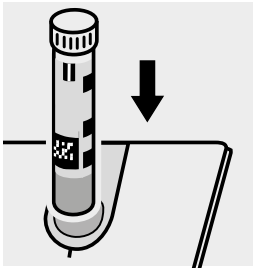


Shake the cell vigorously to dissolve the solid substance.



Add 3.0 ml of the sample with pipette, close the cell with the screw cap, and mix.

Reaction time:
2 minutes



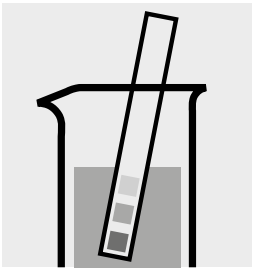
Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Sulfite

1.14394

Cell Test

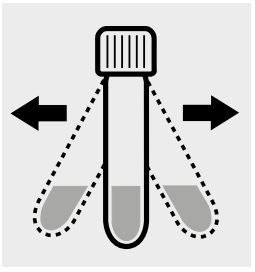
Measuring range: 0.05 – 3.00 mg/l SO_3



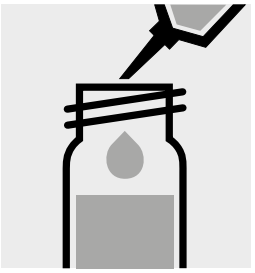
Check the pH of the sample, specified range: pH 4–9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

Select method no. **127**.

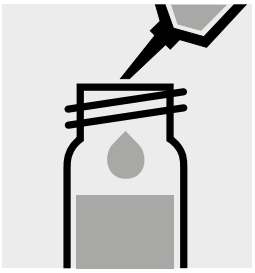
Add 1 level grey micro-spoon each of **SO_3-1K** into two reaction cells, close with the screw cap.



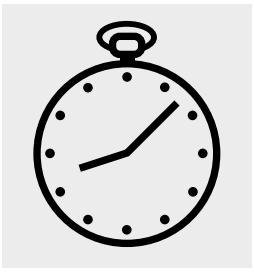
Shake both cells vigorously to dissolve the solid substance.



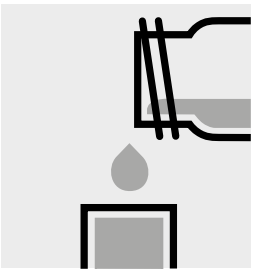
Add 7.0 ml of the sample with pipette to one reaction cell, close with the screw cap, and mix.



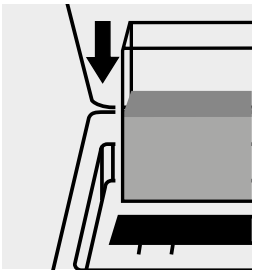
Add 7.0 ml of distilled water with pipette to the second reaction cell, close with the screw cap, and mix.
(Blank)



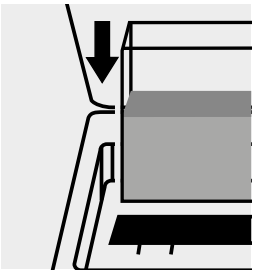
Reaction time:
2 minutes



Transfer both solutions into two separate 50-mm cells.



Place the blank cell into the cell compartment.



Place the cell containing the sample into the cell compartment.

Quality assurance:

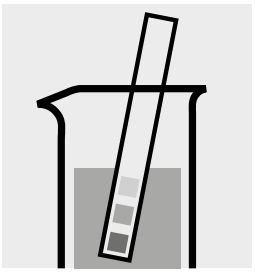
To check the measurement system (test reagents, measurement device, and handling) a sulfite standard solution must be prepared from sodium sulfite GR, Cat.No. 1.06657 (see section "Standard solutions").

Sulfite

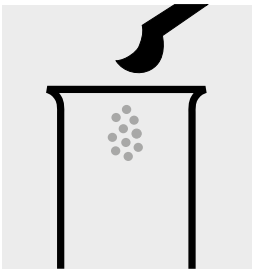
1.01746

Test

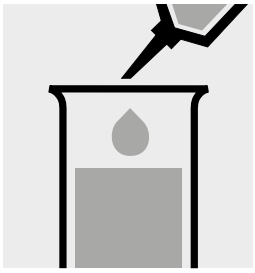
Measuring range:	1.0 – 60.0 mg/l SO_3	10-mm cell
	0.8 – 48.0 mg/l SO_2	10-mm cell
	Expression of results also possible in mmol/l.	



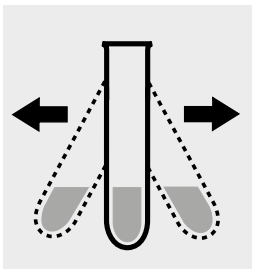
Check the pH of the sample, specified range: pH 4–9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



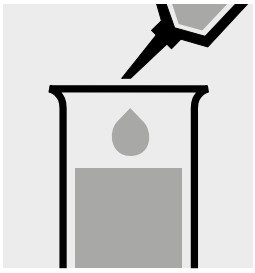
Place 1 level grey micro-spoon of **SO_3-1** into a dry test tube.



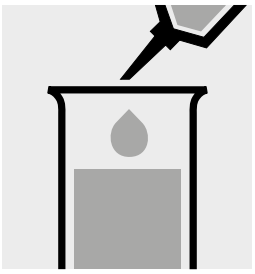
Add 3.0 ml of **SO_3-2** with pipette.



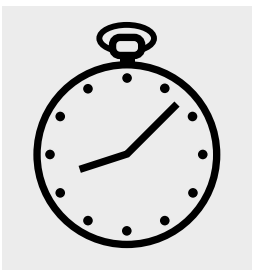
Shake vigorously to dissolve the solid substance.



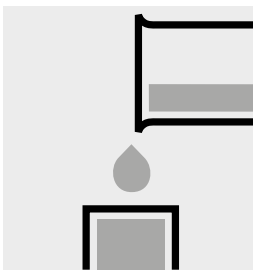
Add 5.0 ml of distilled water with pipette and mix.



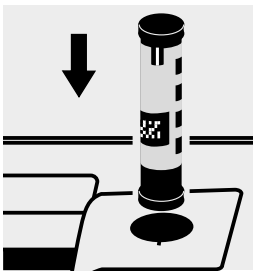
Add 2.0 ml of the sample with pipette and mix.



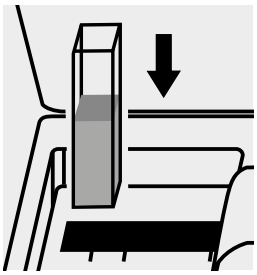
Reaction time:
2 minutes



Transfer the solution into a cell.



Select method with AutoSelector.



Place the cell into the cell compartment.

Quality assurance:

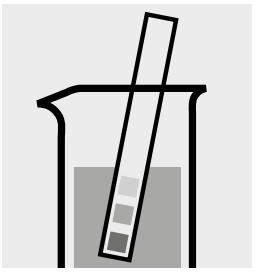
To check the measurement system (test reagents, measurement device, and handling) a sulfite standard solution must be prepared from sodium sulfite GR, Cat.No. 1.06657 (see section "Standard solutions").

Surfactants (anionic)

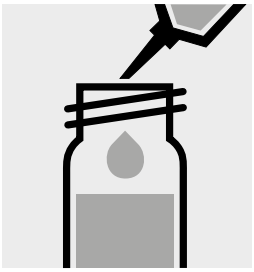
1.02552

Cell Test

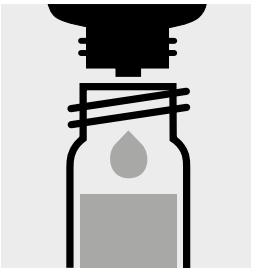
Measuring range:	0.05 – 2.00 mg/l SDAS*
	*sodium 1-dodecanesulfonate
	0.06 – 2.56 mg/l SDBS*
	*sodium dodecylbenzenesulfonate
	0.05 – 2.12 mg/l SDS*
	*sodium dodecyl sulfate
	0.08 – 3.26 mg/l SDOSSA*
	*sodium dioctyl sulfosuccinate
	Expression of results also possible in mmol/l.



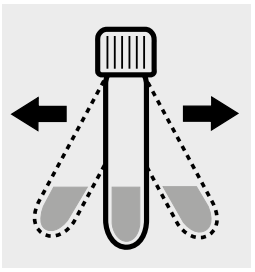
Check the pH of the sample, specified range: pH 5 – 10.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell, **do not mix**!

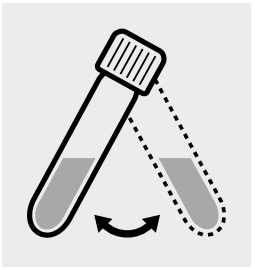


Add 2 drops of **T-1K**, close the cell with the screw cap.

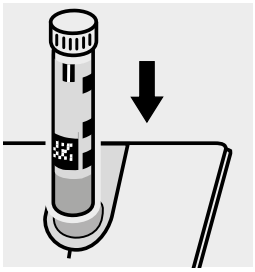


Shake the cell **vigorously for 30 seconds**.

Reaction time: 10 minutes



Swirl the cell before the measurement.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

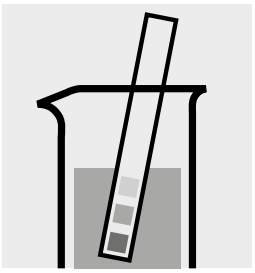
To check the measurement system (test reagents, measurement device, and handling) a surfactants standard solution must be prepared from dodecane-1-sulfonic acid sodium salt GR, Cat.No. 1.12146 (see section "Standard solutions").

Surfactants (cationic)

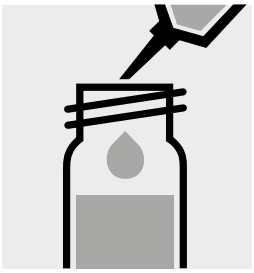
1.01764

Cell Test

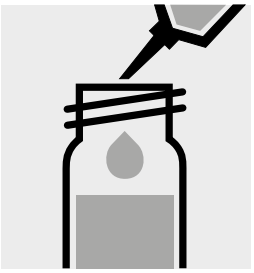
Measuring range:	0.05 – 1.50 mg/l surfactants (cationic) (calculated as N-cetyl-N,N,N-trimethylammonium bromide)



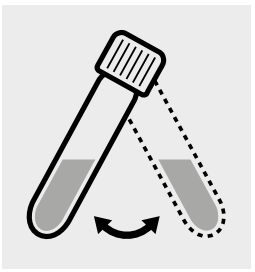
Check the pH of the sample, specified range: pH 3 – 8.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.



Pipette 5.0 ml of the sample into a reaction cell, **do not mix**!

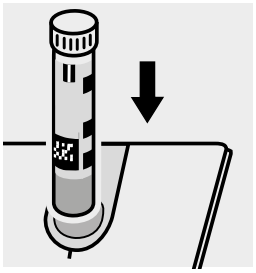


Add 0.50 ml of **T-1K** with pipette and close with the screw cap.



Swirl the cell for 30 seconds.

Reaction time: 5 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

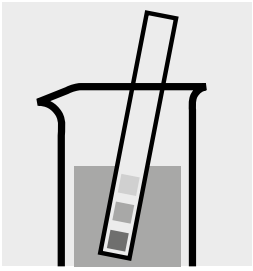
To check the measurement system (test reagents, measurement device, and handling) a surfactants standard solution must be prepared from Cetyltrimethyl-ammonium Bromide, Cat.No. 2.19374 (see section "Standard solutions").

Surfactants (nonionic)

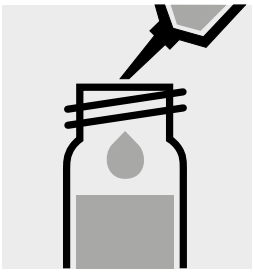
1.01787

Cell Test

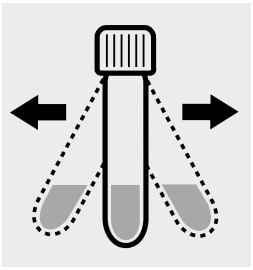
Measuring range:	0.10 – 7.50 mg/l surfactants (nonionic) (calculated as Triton™ X-100)



Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or sulfuric acid drop by drop to adjust the pH.

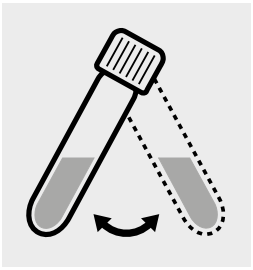


Pipette 4.0 ml of the sample into a reaction cell. Close with the screw cap.

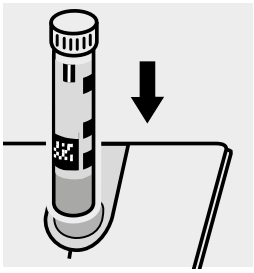


Shake the cell **for 1 minute vigorously**.

Reaction time: 2 minutes



Swirl the cell before measurement.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

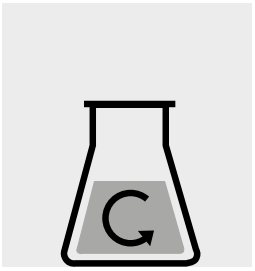
Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a surfactants standard solution must be prepared from Triton™ X-100, Cat.No. 1.12298 (see section "Standard solutions").

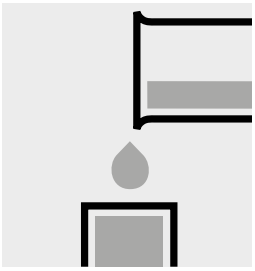
Standard solutions for photometric applications, Cat. Nos. 1.33022, 1.33023, and 1.33024 can also be used.

Suspended Solids

Measuring	5 – 750 mg/l of suspended solid	20-mm cell	Method No. 182
range:	2 – 300 mg/l of suspended solid	50-mm cell	Method No. 182
	1 – 150 mg/l of suspended solid	100-mm cell	Method No. 182

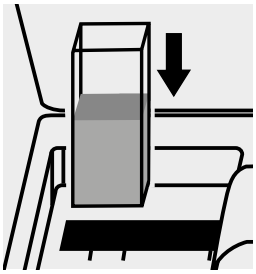


Homogenize 500 ml of sample for 2 minutes in a mixer running at high speed.



Transfer the solution into a cell.

Select method no. **182**.



Place the cell into the cell compartment.
The measurement is performed automatically.

Note:

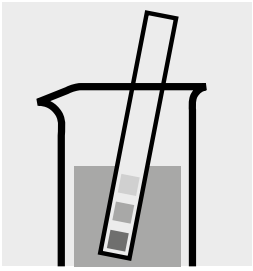
When using the 100-mm rectangular cell, the round-cell holder must be removed before the measurement.

Tin

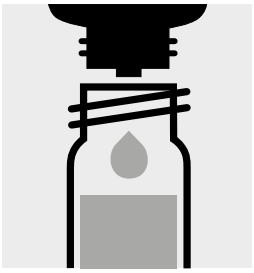
1.14622

Cell Test

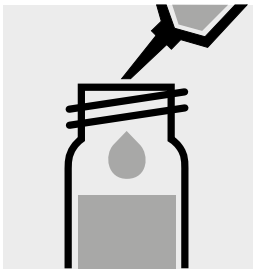
Measuring range:	0.10 – 2.50 mg/l Sn Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH < 3.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



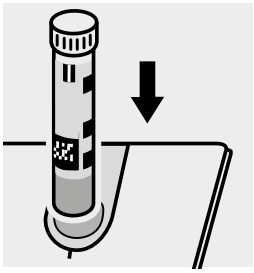
Add 6 drops of **Sn-1K** into a reaction cell, close with the screw cap, and mix.



Add 5.0 ml of the sample with pipette, close the cell with the screw cap, and mix.

Check the pH, specified range: pH 1.5 – 3.5.
If required, add dilute sulfuric acid drop by drop to adjust the pH.

Reaction time:
15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

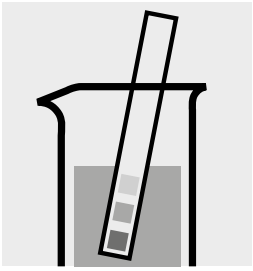
To check the measurement system (test reagents, measurement device, and handling) a tin standard solution must be prepared from ready-to-use tin standard solution Certipur®, Cat.No. 1.70242, concentration 1000 mg/l Sn (see section "Standard solutions").

Tin

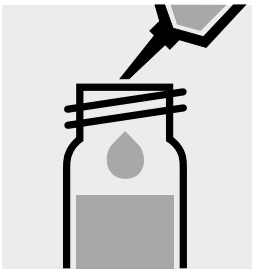
1.17265

Cell Test

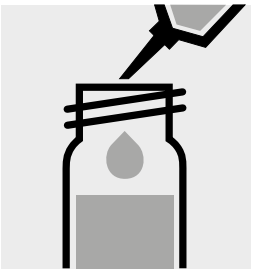
Measuring range:	0.10 – 2.50 mg/l Sn Expression of results also possible in mmol/l.



Check the pH of the sample, specified range: pH 1.5 – 2.2.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

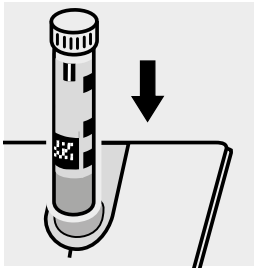


Pipette 4.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 0.50 ml of **Sn-1K** with pipette, close the cell with the screw cap, and mix.

Reaction time:
15 minutes, **measure immediately**.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a tin standard solution must be prepared from ready-to-use tin standard solution Certipur®, Cat.No. 1.70242, concentration 1000 mg/l Sn (see section "Standard solutions").

TOC

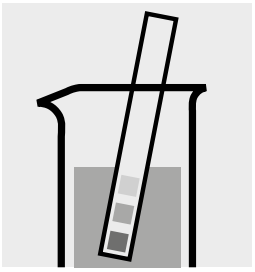
Total Organic Carbon

1.14878

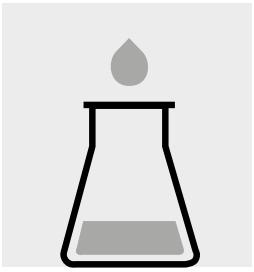
Cell Test

Measuring range: 5.0 – 80.0 mg/l TOC

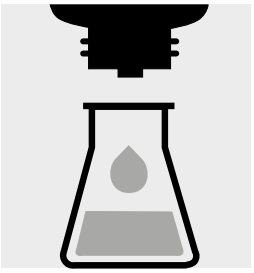
Removal of inorganic bound carbon (TIC):



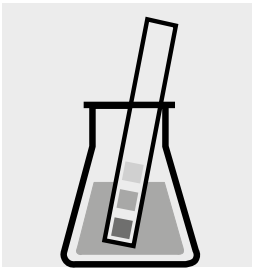
Check the pH of the sample, specified range: pH 2– 12.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



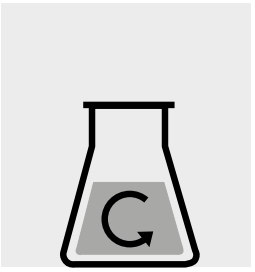
Place 25 ml of the sample into a suitable glass vessel.



Add 3 drops of **TOC-1K** and mix.

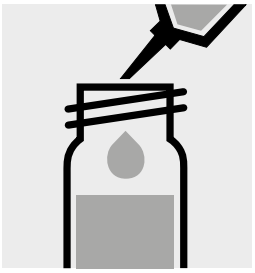


Check the pH, specified range pH < 2.5.



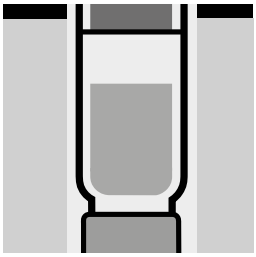
Stir for 10 minutes.

Preparation of measurement sample:

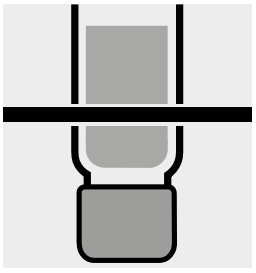


Pipette 3.0 ml of stirred sample into a reaction cell.

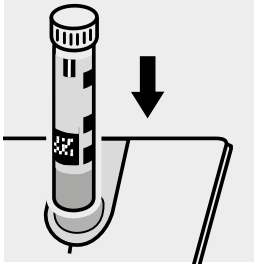
Add 1 level grey micro-spoon of **TOC-2K**. **Immediately** close the cell tightly with an **aluminium cap** (Cat.No. 1.73500).



Heat the cell, standing on its head, at 120 °C in the thermoreactor for 2 hours.



Remove the cell from the thermoreactor and let it, **standing on its head**, to cool for 1 hour.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

In order to enhance the accuracy of the measurement, it must be measured against an own prepared blank sample (preparation as per measurement sample, but with distilled water instead of sample).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a TOC standard solution Certipur®, Cat.No. 1.09017, concentration 1000 mg/l TOC, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32247, 1.32248, and 1.32249.

TOC

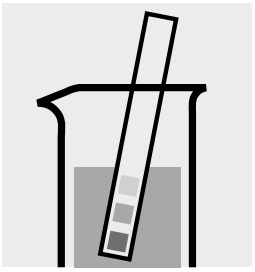
Total Organic Carbon

1.14879

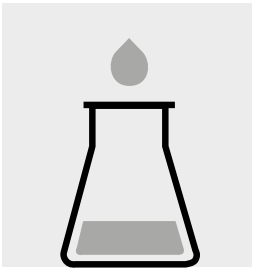
Cell Test

Measuring range: 50 – 800 mg/l TOC

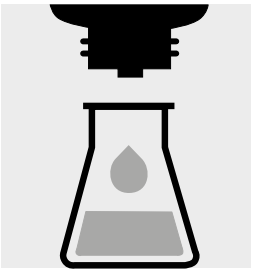
Removal of inorganic bound carbon (TIC):



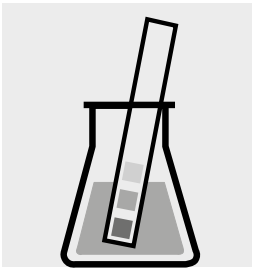
Check the pH of the sample, specified range: pH 2– 12.
If required, add dilute sulfuric acid drop by drop to adjust the pH.



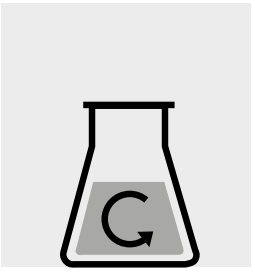
Pipette 1.0 ml of the sample and 9.0 ml of distilled water (Water for chromatography LiChrosolv®, Cat.No. 1.15333, is recommended) into a suitable glass vessel.



Add 2 drops of **TOC-1K** and mix.

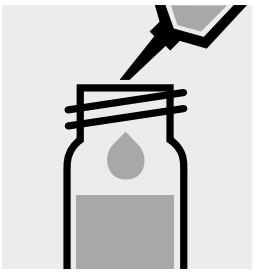


Check the pH, specified range pH < 2.5



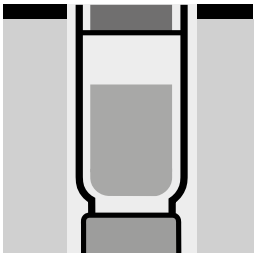
Stir for 10 minutes.

Preparation of measurement sample:

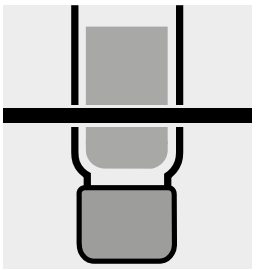


Pipette 3.0 ml of stirred sample into a reaction cell.

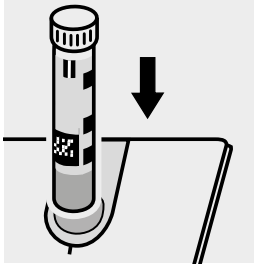
Add 1 level grey microspoon of **TOC-2K**. **Immediately** close the cell tightly with an **aluminium cap** (Cat.No. 1.73500).



Heat the cell, standing on its head, at 120 °C in the thermoreactor for 2 hours.



Remove the cell from the thermoreactor and let it, **standing on its head**, to cool for 1 hour.



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Note:

In order to enhance the accuracy of the measurement, it must be measured against an own prepared blank sample (preparation as per measurement sample, but with distilled water instead of sample).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a TOC standard solution Certipur®, Cat.No. 1.09017, concentration 1000 mg/l TOC, can be used after diluting accordingly as well as the Standard solutions for photometric applications, Cat.Nos. 1.32251, 1.32252, and 1.32253.

Total Hardness

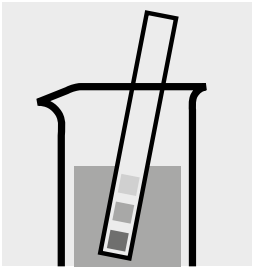
Determination of total hardness

1.00961

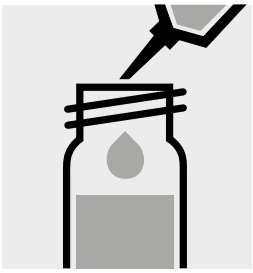
Cell Test

Measuring range:	5 – 215	mg/l Ca	
	0.7 – 30.1	°d	
	0.9 – 37.6	°e	
	1.2 – 53.7	°f	

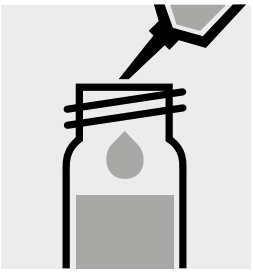
Measuring range:	7 – 301	mg/l CaO	
	12 – 537	mg/l $CaCO_3$	
	0.12 – 5.36	mmol/l Ca/Mg	
	Expression of results also possible in mmol/l.		



Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

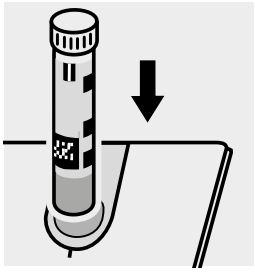


Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



Add 1.0 ml of **H-1K** with pipette, close the cell with the screw cap, and mix.

Reaction time:
3 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a freshly prepared standard solution can be used (see section "Standard solutions").

Total Hardness

Differentiation between Ca- and Mg-hardness

1.00961

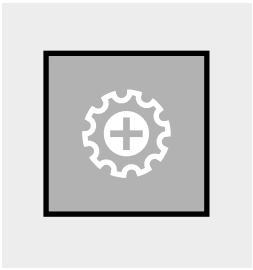
Cell Test

Measuring	0.12 – 5.36	mmol/l
range:	0.7 – 30.1	°d
	0.9 – 37.6	°e
	1.2 – 53.7	°f

If the aim is to differentiate between Calcium- and Magnesium-hardness, after selecting the method it is possible to set the method-specific "Differentiation" mode.
Differentiation possible only in mmol/l.

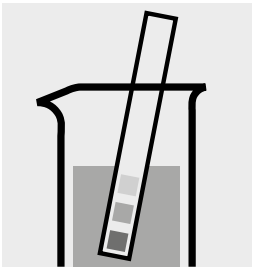
Note: If no differentiation is to be measured, the "Differentiation" mode must be deactivated again.

Select method no. **178**.

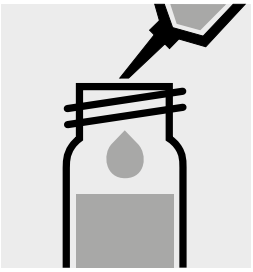


Tap the <Settings> button.
Select "Differentiation" and activate.

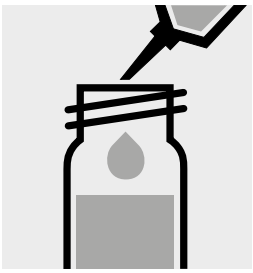
Confirm with <OK>.



Check the pH of the sample, specified range: pH 3 – 9.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

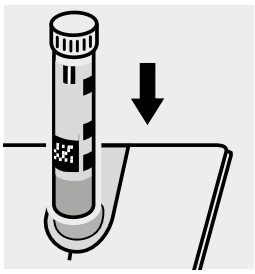


Pipette 1.0 ml of the sample into a reaction cell, close with the screw cap, and mix.



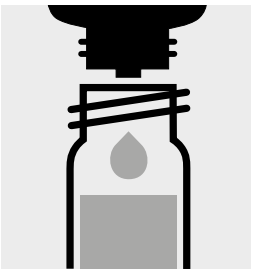
Add 1.0 ml of **H-1K** with pipette, close the cell with the screw cap, and mix.

Reaction time:
3 minutes

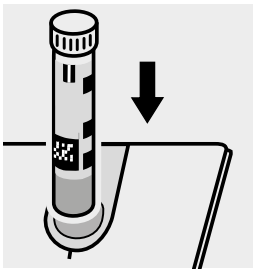


Place the cell **i**nto the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.
= cell A

Confirm with <OK>.



Add 3 drops of **H-2K** to the already measured cell, close the cell with the screw cap, and mix.



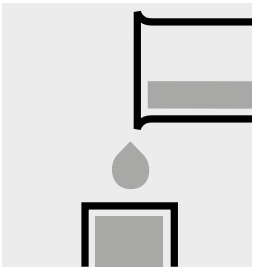
Place the cell **i**nto the cell compartment. Align the mark on the cell with that on the photometer. The measurement is performed automatically.
= cell B

Confirm with <OK>.
The results A (Σ Ca/Mg), B (Mg), and C (Ca) are shown in the display in mg/l.

Turbidity

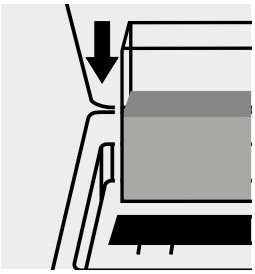
analogous to **EN ISO 7027**

Measuring range:	1 – 100 FAU	550 nm	50-mm cell	Method No. 77



Transfer the sample into a cell.

Select method no. **77**.



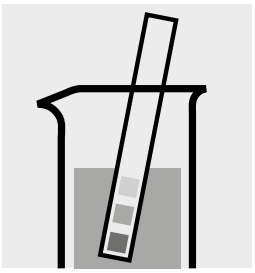
Place the cell into the cell compartment.
The measurement is performed automatically.

Volatile Organic Acids

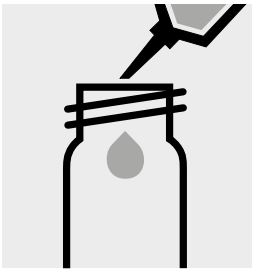
1.01749

Cell Test

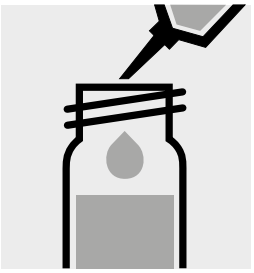
Measuring range:	50 – 3000 mg/l volatile organic acid (calculated as acetic acid) 71 – 4401 mg/l volatile organic acid (calculated as butyric acid)



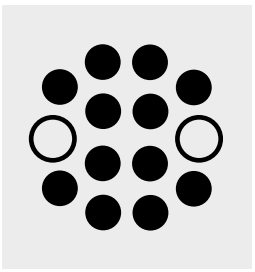
Check the pH of the sample, specified range: pH 2– 12.



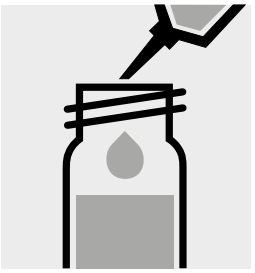
Pipette 0.50 ml of **OA-1K** into a round cell.



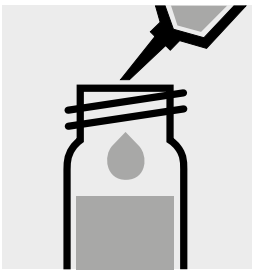
Add 0.50 ml of the sample with pipette, close with the screw cap, and mix.



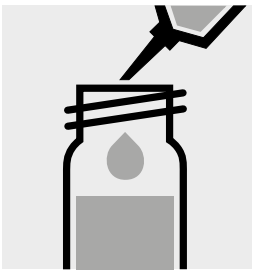
Heat the cell in the thermoreactor at 100 °C for 15 minutes. Then cool to room temperature under running water.



Add 1.0 ml of **OA-2K** with pipette.

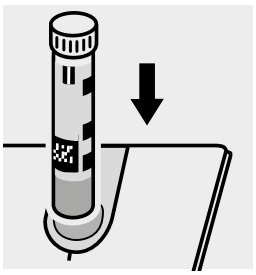


Add 1.0 ml of **OA-3K** with pipette, close the cell with the screw cap, and mix.



Add 1.0 ml of **OA-4K** with pipette, close the cell with the screw cap, and shake vigorously.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

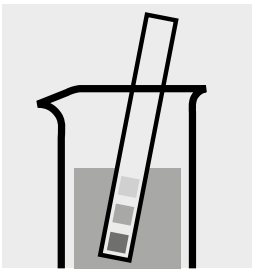
To check the measurement system (test reagents, measurement device, and handling) a standard solution must be prepared from sodium acetate anhydrous, Cat.No. 1.06268 (see section "Standard solutions").

Volatile Organic Acids

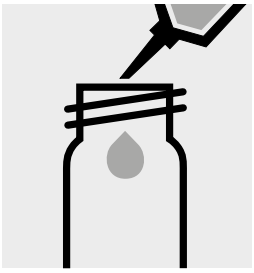
1.01809

Test

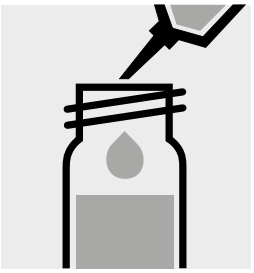
Measuring range:	50 – 3000 mg/l volatile organic acid (calculated as acetic acid) 71 – 4401 mg/l volatile organic acid (calculated as butyric acid)



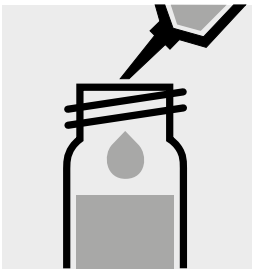
Check the pH of the sample, specified range: pH 2 – 12.



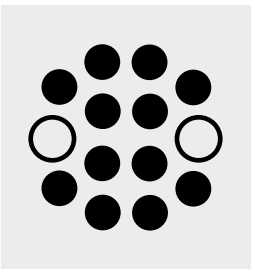
Pipette 0.75 ml of **OA-1** into a round cell.



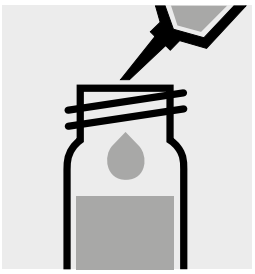
Add 0.50 ml of **OA-2** with pipette.



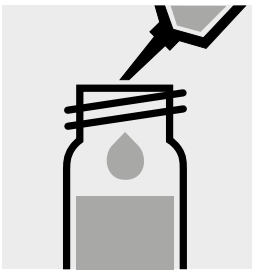
Add 0.50 ml of the sample with pipette, close with the screw cap, and mix.



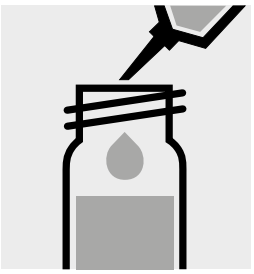
Heat the cell in the thermoreactor at 100 °C for 15 minutes. Then cool to room temperature under running water.



Add 1.0 ml of **OA-3** with pipette.

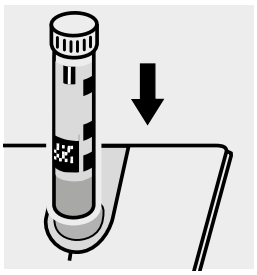


Add 1.0 ml of **OA-4** with pipette, close the cell with the screw cap, and mix.



Add 1.0 ml of **OA-5** with pipette, close the cell with the screw cap, and shake vigorously.

Reaction time:
1 minute



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) a standard solution must be prepared from sodium acetate anhydrous, Cat.No. 1.06268 (see section "Standard solutions").

Yellow Pigment
in Durum wheat flour and semolina

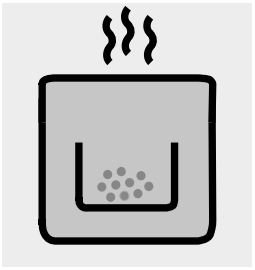
corresponds to **EN ISO 11052** and **German Food and Feed Code §64 LFGB 16.01-3**

Application

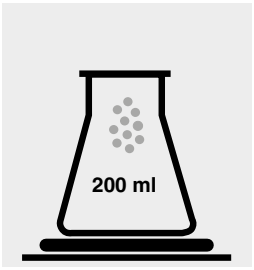
Measuring range:	0.000 – 1.250 mg/100 g	10-mm cell	Method No. 2541
Attention!	Prior to the measurement of the first sample, the system automatically prompts a zero adjustment		
	prepared from distilled water (Water for analysis EMSURE®, Cat.No. 1.16754), is recommended.		
	This zero value remains valid until the method is exited.		

Preparation:
Moisture content determination | Extraction

Measurement:

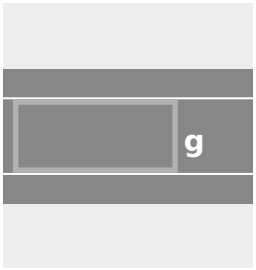


Determine the moisture content acc. to ISO 712 [3].
Note the moisture content, accurate to 0.01 %.



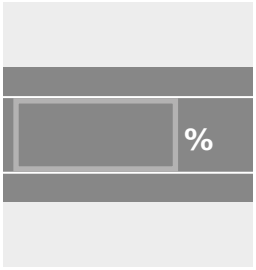
Weigh 10 g of pretreated sample, accurately weighed to 1 mg, into a 200-ml Erlenmeyer flask perform an extraction acc. to EN ISO 11052 [1] or §64 LFGB 16.01-3 [2]: **measurement sample**.

Select method no. **2541**. Perform the zero adjustment and confirm by pressing the <OK> button.

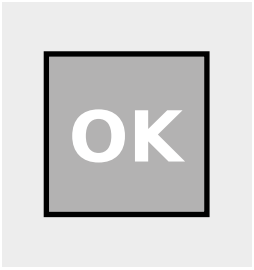


Enter the sample weight in grams.

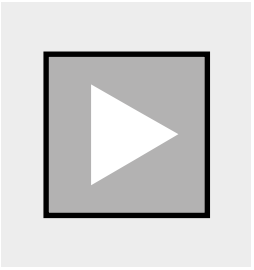
Confirm with <OK>.



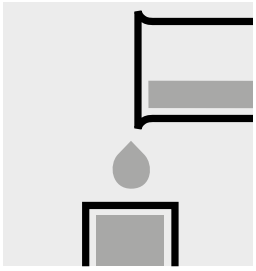
Enter the moisture content in %.



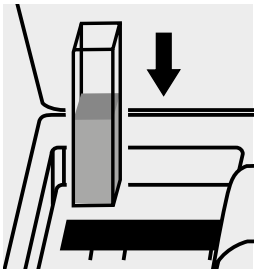
Confirm with <OK>.



Tap the <Start> button.

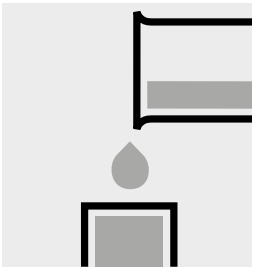


Transfer the **extraction solution** (reagent blank) into the cell.

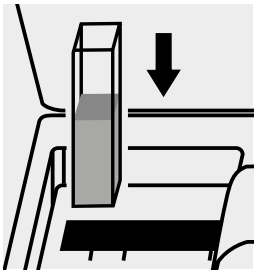


Place the cell into the cell compartment.
The blank measurement is performed automatically.

Confirm with <OK>.

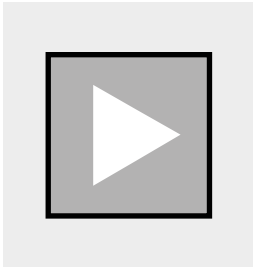


Transfer the **measurement sample** into the cell.



Place the cell into the cell compartment.
The measurement is performed automatically.

Confirm with <OK>.
The result is shown in the display.



Tap the <Start> button to start the measurement procedure for the next sample.
The system does not prompt a repeat of the zero adjustment.

Important:

For each new measurement series, the pre-programmed calibration must be checked using standard solutions (see section “Adjustment”). If there are any significant deviations, the method must be recalibrated. Proceed according to the application instructions.

Important:

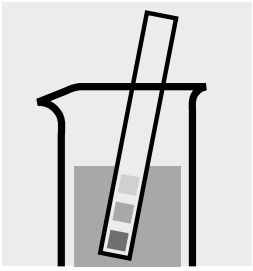
The exact procedure as well as further details on the method used can be found in the corresponding application. This application can be downloaded from the website.

Zinc

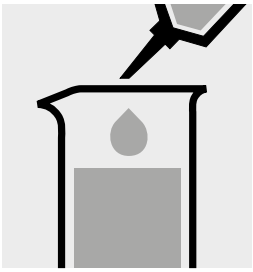
1.00861

Cell Test

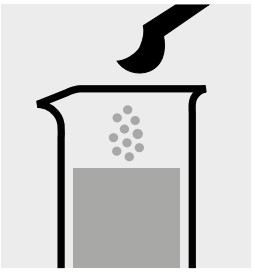
Measuring range:	0.025 – 1.000 mg/l Zn Expression of results also possible in mmol/l.



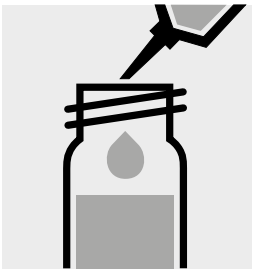
Check the pH of the sample, specified range: pH 1– 7.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



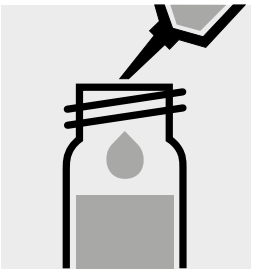
Pipette 10 ml of sample into a glass vessel.



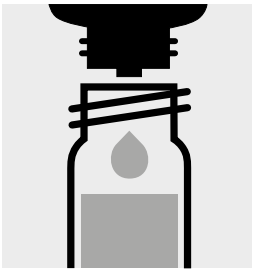
Add 1 level green micro-spoon of **Zn-1K** and shake to dissolve the solid substance: **sample-reagent mixture**.



Pipette 0.50 ml of **Zn-2K** into a reaction cell, close with the screw cap, and mix.

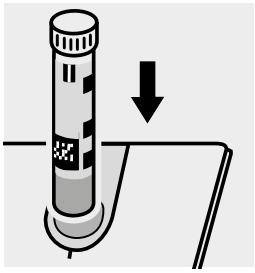


Add 2.0 ml of the **sample-reagent mixture** with pipette, close the cell with the screw cap, and mix.



Add 5 drops of **Zn-3K**, close the cell with the screw cap, and mix.

Reaction time:
15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total zinc** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of zinc (Σ Zn).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701.

Ready-to-use zinc standard solution Certipur®, Cat.No. 1.19806, concentration 1000 mg/l Zn, can also be used after diluting accordingly.

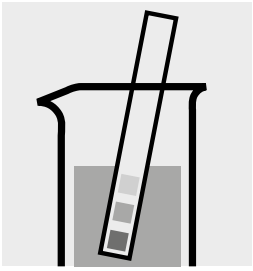
To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Zinc

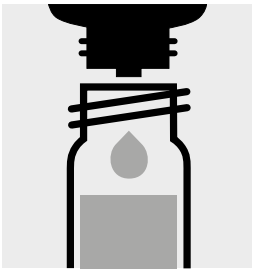
1.14566

Cell Test

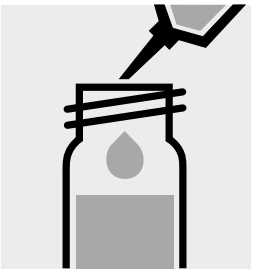
Measuring range:	0.20 – 5.00 mg/l Zn Expression of results also possible in mmol/l.



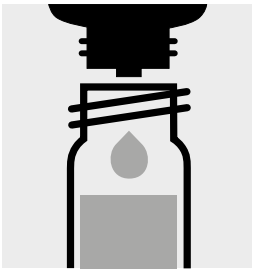
Check the pH of the sample, specified range: pH 3 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.



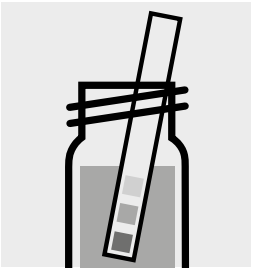
Add 5 drops of **Zn-1K** into a reaction cell, close with the screw cap, and mix.



Add 0.50 ml of the sample with pipette, close the cell with the screw cap, and mix.

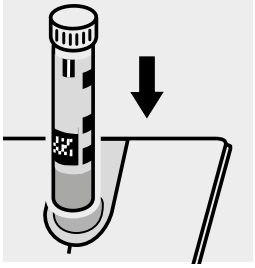


Add 5 drops of **Zn-2K**, close the cell with the screw cap, and mix.



Check the pH, specified range: pH 9.0 – 10.5.

Reaction time:
15 minutes



Place the cell into the cell compartment. Align the mark on the cell with that on the photometer.

Important:

For the determination of **total zinc** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of zinc (Σ Zn).

Quality assurance:

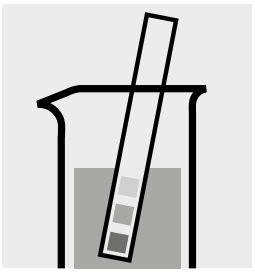
To check the measurement system (test reagents, measurement device, and handling) ready-to-use zinc standard solution Certipur®, Cat.No. 1.19806, concentration 1000 mg/l Zn, can be used after diluting accordingly.

Zinc

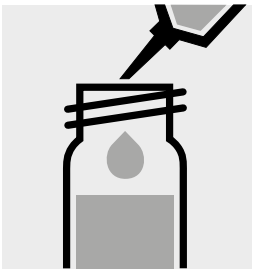
1.14832

Test

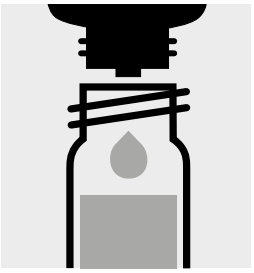
Measuring range:	0.05 – 2.50 mg/l Zn Expression of results also possible in mmol/l.	10-mm cell



Check the pH of the sample, specified range: pH 4 – 10.
If required, add dilute sodium hydroxide solution or hydrochloric acid drop by drop to adjust the pH.

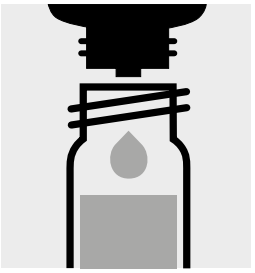


Pipette 5.0 ml of the sample into a test tube with screw cap.



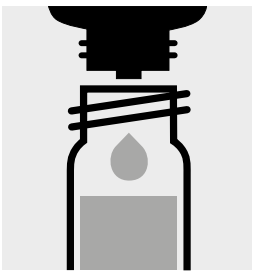
Add 5 drops of **Zn-1**, close the test tube with the screw cap, and mix.

Check the pH, specified range:
pH 12 –13.
If required, add dilute sodium hydroxide solution drop by drop to adjust the pH.



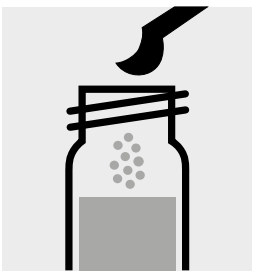
Add 2 drops of **Zn-2**, close the test tube with the screw cap, and mix.

Add 5 drops of **Zn-3**, close the test tube with the screw cap, and mix.

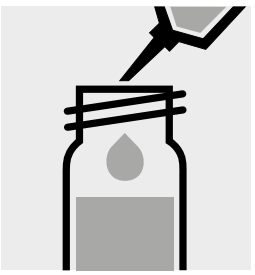


Add 3 drops of **Zn-4**, close the test tube with the screw cap, and mix.

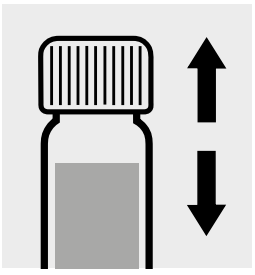
Reaction time:
3 minutes



Add 1 level grey micro-spoon of **Zn-5**, close the test tube with the screw cap, and dissolve the solid substance.

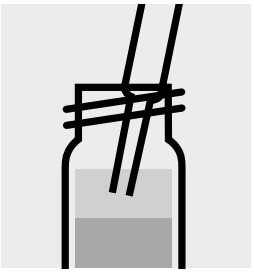


Add 5.0 ml of **Zn-6** (Cat.No. 1.06146, Isobutyl methyl ketone) with pipette and close the test tube with the screw cap.

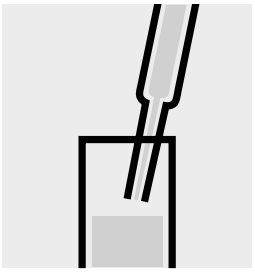


Shake the tube vigorously for 30 seconds.

Leave to stand for 2 minutes.

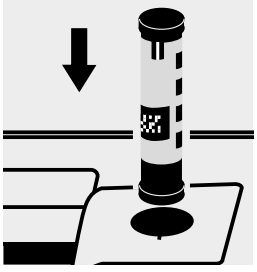


Aspirate the clear upper phase from the tube with pipette.

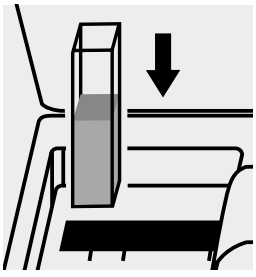


Transfer the solution into a cell.

Leave to stand for 3 minutes.



Select method with AutoSelector.



Place the cell into the cell compartment.

Important note:

To compensate for any potential effects of the required auxiliary reagents on the measurement result, it is absolutely necessary to measure against an own prepared blank sample (preparation as per measurement sample, but with distilled water instead of sample).

Important:

For the determination of **total zinc** a pretreatment with Crack Set 10C, Cat.No. 1.14688, or Crack Set 10, Cat.No. 1.14687, and thermoreactor is necessary.

Result can be expressed as sum of zinc (Σ Zn).

Quality assurance:

To check the measurement system (test reagents, measurement device, and handling) we recommended to use Spectroquant® CombiCheck 100, Cat.No. 1.18701.

Ready-to-use zinc standard solution Certipur®, Cat.No. 1.19806, concentration 1000 mg/l Zn, can also be used after diluting accordingly.

To check for sample-dependent effects the use of addition solutions (e.g. in CombiCheck 100) is highly recommended.

Analytical Procedures and Appendices

II Suitability of test kits for testing seawater and tolerance limits of neutral salts

Test kit	Cat. No.	suitable for seawater	Limit of tolerance, salts in %		
			NaCl	$NaNO_3$	Na_2SO_4
Acid Capacitiy Cell Test	1.01758	no	-	-	-
Aluminium Cell Test	1.00594	yes	20	20	20
Aluminium Test	1.14825	yes	10	20	20
Ammonium Cell Test	1.14739	no	5	5	5
Ammonium Cell Test	1.14558	yes	20	10	15
Ammonium Cell Test	1.14544	yes	20	15	20
Ammonium Cell Test	1.14559	yes	20	20	20
Ammonium Test	1.14752	yes [1)]	10	10	20
Ammonium Test	1.00683	yes	20	20	20
AOX Cell Test	1.00675	no	0.4	20	20
Arsenic Test	1.01747	no	10	10	10
BOD Cell Test	1.00687	yes	20	20	20
Boron Cell Test	1.00826	yes	10	20	20
Boron Test	1.14839	no	20	5	20
Bromine Test	1.00605	no	10	10	10
Cadmium Cell Test	1.14834	no	1	10	1
Cadmium Test	1.01745	no	1	10	1
Calcium Cell Test	1.00858	no	2	2	1
Calcium Test	1.14815	yes	20	20	10
Calcium Test	1.00049	no	-	-	-
Chloride Cell Test	1.14730	yes	-	20	1
Chloride Test	1.14897	yes	-	10	0.1
Chloride Cell Test	1.01804	no	-	0.5	0.05
Chloride Test	1.01807	no	-	0.5	0.05
Chlorine Cell Test	1.00595	yes [2)]	10	10	10
Chlorine Cell Test	1.00597	yes [2)]	10	10	10
Chlorine Test	1.00598	yes [2)]	10	10	10
Chlorine Test	1.00602	yes	10	10	10
Chlorine Test	1.00599	yes [2)]	10	10	10
Chlorine reagents (liquid) (free and total)	1.00086/1.00087/ 1.00088	yes [2)]	10	10	10

[1)] This test kit is also suitable for testing seawater after the addition of sodium hydroxide solution (see package insert).
[2)] The test is of limited suitability for seawater. When determining free chlorine in seawater, combined chlorine can be detected completely or partially.

Test kit	Cat. No.	suitable for seawater	Limit of tolerance, salts in %		
			NaCl	$NaNO_3$	Na_2SO_4
Chlorine Dioxide Test	1.00608	yes	10	10	10
Chromate Cell Test (chromium(VI))	1.14552	yes	10	10	10
Chromate Cell Test (chromium total)	1.14552	no	1	10	10
Chromate Test	1.14758	yes	10	10	10
Cobalt Cell Test	1.17244	yes	10	10	20
COD Cell Test	1.14560	no	0.4	10	10
COD Cell Test	1.01796	no	0.4	10	10
COD Cell Test	1.14540	no	0.4	10	10
COD Cell Test	1.14895	no	0.4	10	10
COD Cell Test	1.14690	no	0.4	20	20
COD Cell Test	1.14541	no	0.4	10	10
COD Cell Test	1.14691	no	0.4	20	20
COD Cell Test	1.14555	no	1	10	10
COD Cell Test	1.01797	no	10	20	20
COD Cell Test (Hg free)	1.09772	no	0	10	10
COD Cell Test (Hg free)	1.09773	no	0	10	10
COD Cell Test (seawater)	1.17058	yes	35	10	10
COD Cell Test (seawater)	1.17059	yes	35	10	10
Copper Cell Test	1.14553	yes	15	15	15
Copper Test	1.14767	yes	15	15	15
Cyanide Cell Test	1.14561	no	10	10	10
Cyanide Cell Test	1.02531	no	10	10	10
Cyanide Test	1.09701	no	10	10	10
Cyanuric Acid Test	1.19253	yes	-	-	-
Fluoride Cell Test	1.00809	no	10	10	10
Fluoride Cell Test	1.17243	yes [3)]	0.2	0.2	0.001
Fluoride Test	1.14598	yes	20	20	20
Fluoride Test	1.00822	yes [3)]	0.05	0.05	0.001
Fluoride Test	1.17236	yes [3)]	0.2	0.2	0.002
Formaldehyde Cell Test	1.14500	no	5	0	10
Formaldehyde Test	1.14678	no	5	0	10
Gold Test	1.14821	yes	10	20	5

[3)] distill beforehand analogous APHA 4500-F^- B

Analytical Procedures and Appendice –

II Suitability of test kits for testing seawater and tolerance limits of neutral salts

Test kit	Cat. No.	suitable for seawater	Limit of tolerance, salts in %		
			NaCl	$NaNO_3$	Na_2SO_4
Hydrazine Test	1.09711	no	20	5	2
Hydrogenperoxide Cell Test	1.14731	yes	20	20	20
Hydrogenperoxide Test	1.18789	no	0.1	1	5
Iodine Test	1.00606	no	10	10	10
Iron Cell Test	1.14549	yes	20	20	20
Iron Cell Test	1.14896	no	5	5	5
Iron Test	1.14761	yes	20	20	20
Iron Test	1.00796	yes	20	20	20
Lead Cell Test	1.14833	no	20	20	1
Lead Test	1.09717	no	20	5	15
Magnesium Cell Test	1.00815	yes	2	2	1
Manganese Cell Test	1.00816	no	20	20	20
Manganese Test	1.14770	yes	20	20	20
Manganese Test	1.01846	no	20	25	5
Molybdenum Cell Test	1.00860	no	20	20	5
Molybdenum Test	1.19252	no	-	-	-
Monochloramine Test	1.01632	no	10	10	20
Nickel Cell Test	1.14554	no	20	20	20
Nickel Test	1.14785	no	20	20	20
Nitrat Cell Test	1.14542	no	0.4	-	20
Nitrate Cell Test	1.14563	no	0.2	-	20
Nitrate Cell Test	1.14764	no	0.5	-	20
Nitrate Cell Test	1.00614	no	2	-	20
Nitrate Test	1.14773	no	0.4	-	20
Nitrate Test	1.09713	no	0.2	-	20
Nitrate Cell Test (seawater)	1.14556	yes	20	-	20
Nitrate Test (seawater)	1.14942	yes	20	-	20
Nitrate Test	1.01842	no	0.001	-	0.001
Nitrite Cell Test	1.14547	yes	20	20	15
Nitrite Cell Test	1.00609	yes	20	15	15
Nitrite Test	1.14776	yes	20	20	15
Nitrogen (total) Cell Test	1.14537	no	0.5	-	10

Test kit	Cat. No.	suitable for seawater	Limit of tolerance, salts in %		
			NaCl	$NaNO_3$	Na_2SO_4
Nitrogen (total) Cell Test	1.00613	no	0.2	-	10
Nitrogen (total) Cell Test	1.14763	no	2	-	20
Oxygen Cell Test	1.14694	no	10	5	1
Oxygen Scavengers Test	1.19251	no	-	-	-
Ozone Test	1.00607	yes	10	10	10
pH Cell Test	1.01744	yes	-	-	-
Phenol Cell Test	1.14551	yes	20	20	15
Phenol Test	1.00856	yes	20	20	20
Phosphate Cell Test	1.00474	yes	5	10	10
Phosphate Cell Test (ortho-phosphates)	1.14543	yes	5	10	10
Phosphate Cell Test (phosphorus total)	1.14543	no	1	10	10
Phosphat Cell Test	1.00475	yes	20	20	20
Phosphate Cell Test (ortho-phosphates)	1.14729	yes	20	20	20
Phosphate Cell Test (phosphorus total)	1.14729	yes	5	20	20
Phosphate Cell Test	1.00616	yes	20	20	20
Phosphate Cell Test (ortho-phosphates)	1.00673	yes	20	20	20
Phosphate Cell Test (phosphorus total)	1.00673	yes	20	20	20
Phosphate Test	1.14848	yes	5	10	10
Phosphate Test	1.00798	yes	15	20	10
Phosphate Cell Test	1.14546	yes	20	20	20
Phosphate Test	1.14842	yes	20	20	20
Potassium Cell Test	1.14562	yes	20	20	20
Potassium Cell Test	1.00615	yes	20	20	20
Residual Hardness Cell Test	1.14683	no	0.01	0.01	0.01
Silicate (silicic acid) Test	1.14794	yes	5	10	5
Silicate (silicic acid) Test	1.00857	no	5	10	2.5
Silicate (silicic acid) Test	1.01813	no	0.5	1	0.2
Silver Test	1.14831	no	0	1	5
Sodium Cell Test	1.00885	no	-	10	1
Sulfate Cell Test	1.02532	no	2	0.007	-

Analytical Procedures and Appendice –

II Suitability of test kits for testing seawater and tolerance limits of neutral salts

Test kit	Cat. No.	suitable for seawater	Limit of tolerance, salts in %		
			NaCl	$NaNO_3$	Na_2SO_4
Sulfate Cell Test	1.14548	yes	10	0.1	-
Sulfate Cell Test	1.00617	yes	10	0.1	-
Sulfate Cell Test	1.14564	yes	10	0.5	-
Sulfate Test	1.14791	no	0.2	0.2	-
Sulfate Test	1.01812	no	2	0.007	-
Sulfate Test	1.02537	yes	10	0.015	-
Sulfide Test	1.14779	no	0.5	1	1
Sulfite Cell Test	1.14394	no	20	20	20
Sulfite Test	1.01746	no	20	20	20
Surfactants (anionic) Cell Test	1.02552	no	0.1	0.01	10
Surfactants (cationic) Cell Test	1.01764	no	0.1	0.1	20
Surfactants (nonionic) Cell Test	1.01787	no	2	5	2
Tin Cell Test	1.14622	yes	20	20	20
Tin Cell Test	1.17265	yes	5	5	0.5
TOC Cell Test	1.14878	no	0.5	10	10
TOC Cell Test	1.14879	no	5	20	20
Total Hardness Cell Test	1.00961	no	2	2	1
Volatile Organic Acids Cell Test	1.01749	no	20	20	10
Volatile Organic Acids Test	1.01809	no	20	20	10
Zinc Cell Test	1.00861	no	20	20	1
Zinc Cell Test	1.14566	no	10	10	10
Zinc Test	1.14832	no	5	15	15

Analytical Procedures and Appendices

III Spectroquant® CombiCheck and Standard solutions

Test kit Cat. No. or method	Evaluation as	CombiCheck Cat. No.	Confidence interval Spec. value for the standard	Confidence interval Max. working tolerance	Diluted and ready-to-use standard solutions Cat. No.	Diluted and ready-to-use standard solutions Concentration	Diluted and ready-to-use standard solutions Expanded measurement uncertainty	Ready-to-use standard solution Cat. No.
Acid Capacity Cell Test, 1.01758	OH	-	5.00 mmol/l [1)]	± 0.50 mmol/l	-			see prep. instruction
ADMI		-	50 [1)]	-	-			1.00246
ADMI		-	250 [1)]	-	-			1.00246
Aluminium Cell Test, 1.00594	Al	CC 100, 1.18701	0.40 mg/l	± 0.05 mg/l	1.32225	0.200 mg/l	± 0.006 mg/l	1.19770
Aluminium Test, 1.14825	Al	CC 100, 1.18701	0.40 mg/l	± 0.05 mg/l	1.32225	0.200 mg/l	± 0.006 mg/l	1.19770
Ammonium Cell Test, 1.14739	NH_4-N	CC 50, 1.14695	1.00 mg/l	± 0.10 mg/l	1.25022 1.25023	0.400 mg/l 1.00 mg/l	± 0.012 mg/l ± 0.04 mg/l	 1.19812
	NH_4	-			1.32227	0.250 mg/l	± 0.011 mg/l	1.19812
Ammonium Cell Test, 1.14558	NH_4-N	CC 10, 1.14676	4.00 mg/l	± 0.30 mg/l	1.25022 1.25023 1.25024 1.25025	0.400 mg/l 1.00 mg/l 2.00 mg/l 6.00 mg/l	± 0.012 mg/l ± 0.04 mg/l ± 0.07 mg/l ± 0.13 mg/l	 1.19812
Ammonium Cell Test, 1.14544	NH_4-N	CC 20, 1.14675	12.0 mg/l	± 1.0 mg/l	1.25023 1.25024 1.25025 1.25026	1.00 mg/l 2.00 mg/l 6.00 mg/l 12.0 mg/l	± 0.04 mg/l ± 0.07 mg/l ± 0.13 mg/l ± 0.4 mg/l	 1.19812
Ammonium Cell Test, 1.14559	NH_4-N	CC 70, 1.14689	50.0 mg/l	± 5.0 mg/l	1.25025 1.25026 1.25027	6.00 mg/l 12.0 mg/l 50.0 mg/l	± 0.13 mg/l ± 0.4 mg/l ± 1.2 mg/l	 1.19812
Ammonium Test, 1.14752	NH_4-N	CC 50, 1.14695	1.00 mg/l	± 0.10 mg/l	1.25022 1.25023 1.25024	0.400 mg/l 1.00 mg/l 2.00 mg/l	± 0.012 mg/l ± 0.04 mg/l ± 0.07 mg/l	 1.19812
	NH_4	-			1.32227	0.250 mg/l	± 0.011 mg/l	1.19812
Ammonium Test, 1.00683	NH_4-N	CC 70, 1.14689	50.0 mg/l	± 5.0 mg/l	1.25025 1.25026 1.25027	6.00 mg/l 12.0 mg/l 50.0 mg/l	± 0.13 mg/l ± 0.4 mg/l ± 1.2 mg/l	 1.19812
AOX Cell Test, 1.00675	AOX	-	1.00 mg/l [1)]	± 0.10 mg/l	-			1.00680
Arsenic Test, 1.01747	As	-	0.050 mg/l [1)]	± 0.005 mg/l	1.33002	1.00 mg/l	± 0.05 mg/l	1.19773
BOD Cell Test, 1.00687	O_2	-	198 mg/l	± 40 mg/l	-			1.00718
Boron Cell Test, 1.00826	B	-	1.00 mg/l [1)]	± 0.15 mg/l	1.33005	1.00 mg/l	± 0.06 mg/l	1.19500
Boron Test, 1.14839	B	-	0.400 mg/l [1)]	± 0.040 mg/l	-			1.19500
Bromine Test, 1.00605	Br_2	-	5.00 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Cadmium Cell Test, 1.14834	Cd	CC 90, 1.18700	0.250 mg/l	± 0.030 mg/l	-			1.19777
Cadmium Test, 1.01745	Cd	CC 90, 1.18700	0.250 mg/l	± 0.030 mg/l	1.33008	0.00500 mg/l	± 0,00020 mg/l	1.19777
Calcium Cell Test, 1.00858	Ca	-	75 mg/l [1)]	± 7 mg/l	-			see prep. instruction
Calcium Test, 1.14815	Ca	-	80 mg/l [1)]	± 8 mg/l	-			1.19778

[1)] self prepared, recommended concentration

Test kit	Evaluation	CombiCheck	Confidence interval		Diluted and ready-to-use standard solutions			Ready-to-use standard solution
Cat. No. or method	as	Cat. No.	Spec. value for the standard	Max. working tolerance	Cat. No.	Concen-tration	Expanded measurement uncertainty	Cat. No.
Calcium Test, 1.00049	Ca	-	2.00 mg/l [1)]	± 0.20 mg/l	-			1.19778
Chloride Cell Test, 1.14730	Cl	CC 20, 1.14675 CC 10, 1.14676	60 mg/l 25 mg/l	± 10 mg/l ± 6 mg/l	1.32229 1.32230	10.0 mg/l 50 mg/l	± 0.5 mg/l ± 3 mg/l	1.19897
Chloride Test, 1.14897	Cl	CC 60, 1.14696 -	125 mg/l 12.5 mg/l [1)]	± 13 mg/l ± 1.3 mg/l	1.32229 1.32230	10.0 mg/l 50 mg/l	± 0.5 mg/l ± 3 mg/l	1.19897
Chloride Cell Test, 1.01804	Cl	-	7.5 mg/l [1)]	± 0.8 mg/l	1.33010 1.33011 1.32229	1.00 mg/l 2.50 mg/l 10.0 mg/l	± 0.04 mg/l ± 0.08 mg/l ± 0.5 mg/l	1.19897
Chloride Test, 1.01807	Cl	-	2.50 mg/l [1)]	± 0.25 mg/l	1.33010 1.33011	1.00 mg/l 2.50 mg/l	± 0.04 mg/l ± 0.08 mg/l	1.19897
Chlorine Cell Test, 1.00595	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Cell Test, 1.00597	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Test, 1.00598	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Test, 1.00602	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Test, 1.00599	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Cell Test (liquid reagent), 1.00086/1.00087	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Test (liquid reagent), 1.00086/1.00087	Cl_2	-	0.500 mg/l [1)]	± 0.050 mg/l	-			see prep. instruction
Chlorine Cell Test (liquid reagent), 1.00086/1.00087/1.00088	Cl_2	-	3.00 mg/l [1)]	± 0.30 mg/l	-			see prep. instruction
Chlorine Test (liquid reagent), 1.00086/1.00087/1.00088	Cl_2	-	0.500 mg/l [1)]	± 0.050 mg/l	-			see prep. instruction
Chlorine Dioxide Test, 1.00608	ClO_2	-	5.00 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Chromate Cell Test, 1.14552	Cr	-	1.00 mg/l [1)]	± 0.10 mg/l	1.33013	1.00 mg/l	± 0.03 mg/l	1.19780
Chromate Test, 1.14758	Cr	-	1.00 mg/l [1)]	± 0.10 mg/l	1.33012 1.33013	0.050 mg/l 1.00 mg/l	± 0.002 mg/l ± 0.03 mg/l	1.19780
Cobalt Cell Test, 1.17244	Co	-	1.00 mg/l [1)]	± 0.10 mg/l	-			1.19785
COD Cell Test, 1.14560	COD	CC 50, 1.14695	20.0 mg/l	± 4.0 mg/l	1.25028	20.0 mg/l	± 0.7 mg/l	see prep. instruction
COD Cell Test, 1.01796	COD	CC 50, 1.14695	20.0 mg/l	± 2.0 mg/l	1.25028	20.0 mg/l	± 0.7 mg/l	see prep. instruction
COD Cell Test, 1.14540	COD	CC 10, 1.14676	80 mg/l	± 12 mg/l	1.25029	100 mg/l	± 3 mg/l	see prep. instruction
COD Cell Test, 1.14895	COD	CC 60, 1.14696	250 mg/l	± 20 mg/l	1.25029 1.25030	100 mg/l 200 mg/l	± 3 mg/l ± 4 mg/l	see prep. instruction
COD Cell Test, 1.14690	COD	CC 60, 1.14696	250 mg/l	± 25 mg/l	1.25029 1.25030 1.25031	100 mg/l 200 mg/l 400 mg/l	± 3 mg/l ± 4 mg/l ± 5 mg/l	see prep. instruction
COD Cell Test, 1.14541	COD	CC 20, 1.14675	750 mg/l	± 75 mg/l	1.25029 1.25030 1.25031 1.25032	100 mg/l 200 mg/l 400 mg/l 1000 mg/l	± 3 mg/l ± 4 mg/l ± 5 mg/l ± 11 mg/l	see prep. instruction

[1)] self prepared, recommended concentration

Test kit	Evaluation	CombiCheck	Confidence interval		Diluted and ready-to-use standard solutions			Ready-to-use standard solution
Cat. No. or method	as	Cat. No.	Spec. value for the standard	Max. working tolerance	Cat. No.	Concen-tration	Expanded measurement uncertainty	Cat. No.
COD Cell Test, 1.14691	COD	CC 80, 1.14738	1500 mg/l	± 150 mg/l	1.25031 1.25032 1.25033	400 mg/l 1000 mg/l 2000 mg/l	± 5 mg/l ± 11 mg/l ± 32 mg/l	see prep. instruction
COD Cell Test, 1.14555	COD	CC 70, 1.14689	5000 mg/l	± 400 mg/l	1.25032 1.25033 1.25034	1000 mg/l 2000 mg/l 8000 mg/l	± 11 mg/l ± 32 mg/l ± 68 mg/l	see prep. instruction
COD Cell Test, 1.01797	COD	-	50 000 mg/l [1)]	± 5000 mg/l	1.25034 1.25035	8000 mg/l 50 000 mg/l	± 68 mg/l ± 894 mg/l	see prep. instruction
COD Cell Test, 1.09772	COD	-	80 mg/l [1)]	± 12 mg/l	1.25028 1.25029	20.0 mg/l 100 mg/l	± 0.7 mg/l ± 3 mg/l	see prep. instruction
COD Cell Test, 1.09773	COD	-	750 mg/l [1)]	± 75 mg/l	1.25029 1.25030 1.25031 1.25032	100 mg/l 200 mg/l 400 mg/l 1000 mg/l	± 3 mg/l ± 4 mg/l ± 5 mg/l ± 11 mg/l	see prep. instruction
COD Cell Test, 1.17058	COD	-	30.0 mg/l [1)]	± 3.0 mg/l	-			see prep. instruction
COD Cell Test, 1.17059	COD	-	1500 mg/l [1)]	± 150 mg/l	-			see prep. instruction
Color Hazen	Pt/Co (Hazen)	-	250 mg/l [1)]		-			1.00246
Color Hazen	Pt/Co (Hazen)	-	500 mg/l		-			1.00246
Copper Cell Test, 1.14553	Cu	CC 90, 1.18700	2.00 mg/l	± 0.20 mg/l	-			1.19786
Copper Test, 1.14767	Cu	CC 90, 1.18700	2.00 mg/l	± 0.20 mg/l	-			1.19786
Cyanide Cell Test, 1.02531	CN	-	0.250 mg/l [1)]	± 0.030 mg/l	-			1.19533
Cyanide Cell Test, 1.14561	CN	-	0.250 mg/l [1)]	± 0.030 mg/l	-			1.19533
Cyanide Test, 1.09701	CN	-	0.250 mg/l [1)]	± 0.030 mg/l	-			1.19533
Cyanuric Acid Test, 1.19253	Cyan Acid	-	80 mg/l [1)]	± 10 mg/l	-			see prep. instruction
Fluoride Cell Test, 1.00809	F	-	0.75 mg/l [1)]	± 0.08 mg/l	1.32234 1.32233 1.32235 1.32236	0.200 mg/l 0.50 mg/l 1.00 mg/l 1.50 mg/l	± 0.012 mg/l ± 0.02 mg/l ± 0.03 mg/l ± 0.04 mg/l	1.19814
Fluoride Cell Test, 1.17243	F	-	1.00 mg/l [1)]	± 0.15 mg/l	1.32234 1.32233 1.32235 1.32236	0.200 mg/l 0.50 mg/l 1.00 mg/l 1.50 mg/l	± 0.012 mg/l ± 0.02 mg/l ± 0.03 mg/l ± 0.04 mg/l	1.19814
Fluoride Test, 1.14598	F	-	1.00 mg/l [1)] 10.0 mg/l [1)]	± 0.15 mg/l ± 1.2 mg/l	1.32234 1.32233 1.32235 1.32236	0.200 mg/l 0.50 mg/l 1.00 mg/l 1.50 mg/l	± 0.012 mg/l ± 0.02 mg/l ± 0.03 mg/l ± 0.04 mg/l	1.19814
Fluoride Test, 1.00822	F	-	1.00 mg/l [1)]	± 0.15 mg/l	1.32234 1.32233 1.32235 1.32236	0.200 mg/l 0.50 mg/l 1.00 mg/l 1.50 mg/l	± 0.012 mg/l ± 0.02 mg/l ± 0.03 mg/l ± 0.04 mg/l	1.19814

[1)] self prepared, recommended concentration

Test kit	Evaluation	CombiCheck	Confidence interval		Diluted and ready-to-use standard solutions			Ready-to-use standard solution
Cat. No. or method	as	Cat. No.	Spec. value for the standard	Max. working tolerance	Cat. No.	Concen-tration	Expanded measurement uncertainty	Cat. No.
Fluoride Test, 1.17236	F	-	1.00 mg/l [1)]	± 0.15 mg/l	1.32234 1.32233 1.32235 1.32236	0.200 mg/l 0.50 mg/l 1.00 mg/l 1.50 mg/l	± 0.012 mg/l ± 0.02 mg/l ± 0.03 mg/l ± 0.04 mg/l	1.19814
Formaldehyde Cell Test, 1.14500	HCHO	-	5.00 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Formaldehyde Test, 1.14678	HCHO	-	4.50 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Gold Test, 1.14821	Au	-	6.0 mg/l [1)]	± 0.6 mg/l	-			1.70216
Hydrazine Test, 1.09711	N_2H_4	-	1.00 mg/l [1)]	± 0.10 mg/l	-			see prep. instruction
Hydrogenperoxide Cell Test, 1.14731	H_2O_2	-	10.0 mg/l [1)]	± 1.0 mg/l	-			see prep. instruction
Hydrogenperoxide Test, 1.18789	H_2O_2	-	2.00 mg/l [1)]	± 0.20 mg/l	-			see prep. instruction
Iodine Test, 1.00606	I_2	-	5.00 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Iron Cell Test, 1.14549	Fe	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.33018 1.33019 1.33020	0.1000 mg/l 0.300 mg/l 1.00 mg/l	± 0.0030 mg/l ± 0.009 mg/l ± 0.04 mg/l	1.19781
Iron Cell Test, 1.14896	Fe	-	25.0 mg/l [1)]	± 2.5 mg/l	-			1.19781
Iron Test, 1.14761	Fe	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.33014 1.33018 1.33019 1.33020	0.0500 mg/l 0.1000 mg/l 0.300 mg/l 1.00 mg/l	± 0.0015 mg/l ± 0.0030 mg/l ± 0.009 mg/l ± 0.04 mg/l	1.19781
Iron Test, 1.00796	Fe	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.33014 1.33018 1.33019 1.33020	0.0500 mg/l 0.1000 mg/l 0.300 mg/l 1.00 mg/l	± 0.0015 mg/l ± 0.0030 mg/l ± 0.009 mg/l ± 0.04 mg/l	1.19781
Lead Cell Test, 1.14833	Pb	CC 100, 1.18701	2.00 mg/l	± 0.20 mg/l	-			1.19776
Lead Test, 1.09717	Pb	CC 100, 1.18701	2.00 mg/l	± 0.20 mg/l	1.33003 1.33004	0.050 mg/l 0.100 mg/l	± 0.004 mg/l ± 0.005 mg/l	1.19776
Magnesium Cell Test, 1.00815	Mg	-	40.0 mg/l [1)]	± 4.0 mg/l	-			see prep. instruction
Manganese Cell Test, 1.00816	Mn	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.32238 1.32239	0.200 mg/l 1.00 mg/l	± 0.005 mg/l ± 0.03 mg/l	1.19789
Manganese Test, 1.14770	Mn	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.32237 1.32238 1.32239	0.050 mg/l 0.200 mg/l 1.00 mg/l	± 0.004 mg/l ± 0.005 mg/l ± 0.03 mg/l	1.19789
Manganese Test, 1.01846	Mn	CC 90, 1.18700	1.00 mg/l	± 0.15 mg/l	1.32237 1.32238 1.32239	0.050 mg/l 0.200 mg/l 1.00 mg/l	± 0.004 mg/l ± 0.005 mg/l ± 0.03 mg/l	1.19789
Molybdenum Cell Test, 1.00860	Mo	-	0.50 mg/l [1)]	± 0.05 mg/l	-			1.70227
Molybdenum Test, 1.19252	Mo	-	25.0 mg/l [1)]	± 2.5 mg/l	-			1.70227

[1)] self prepared, recommended concentration

Test kit	Evaluation	CombiCheck	Confidence interval		Diluted and ready-to-use standard solutions			Ready-to-use standard solution
Cat. No. or method	as	Cat. No.	Spec. value for the standard	Max. working tolerance	Cat. No.	Concen-tration	Expanded measurement uncertainty	Cat. No.
Monochloramine Test, 1.01632	Cl_2	-	5.00 mg/l [1)]	± 0.50 mg/l	-			see prep. instruction
Nickel Cell Test, 1.14554	Ni	CC 100, 1.18701	2.00 mg/l	± 0.20 mg/l	-			1.09989
Nickel Test, 1.14785	Ni	CC 100, 1.18701	2.00 mg/l	± 0.20 mg/l	-			1.09989
Nitrate Cell Test, 1.14542	NO_3-N	CC 20, 1.14675	9.0 mg/l	± 0.9 mg/l	1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	1.19811
	NO_3	-			1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Cell Test, 1.14563	NO_3-N	CC 20, 1.14675	9.0 mg/l	± 0.9 mg/l	1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	1.19811
	NO_3	-			1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Cell Test, 1.14764	NO_3-N	CC 80, 1.14738	25.0 mg/l	± 2.5 mg/l	1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	
					1.25039	40.0 mg/l	± 1.0 mg/l	1.19811
	NO_3	-			1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Cell Test, 1.00614	NO_3-N	-	100 mg/l [1)]	± 10 mg/l	1.25039	40.0 mg/l	± 1.0 mg/l	
					1.25040	200 mg/l	± 5 mg/l	1.19811
Nitrate Test, 1.14773	NO_3-N	CC 20, 1.14675	9.0 mg/l	± 0.9 mg/l	1.25036	0.500 mg/l	± 0.05 mg/l	
		CC 10, 1.14676	2.50 mg/l	± 0.25 mg/l	1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	1.19811
	NO_3	-			1.32240	1.00 mg/l	± 0.03 mg/l	
					1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Test, 1.09713	NO_3-N	CC 20, 1.14675	9.0 mg/l	± 0.9 mg/l	1.25036	0.500 mg/l	± 0.05 mg/l	
		CC 10, 1.14676	2.50 mg/l	± 0.25 mg/l	1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	1.19811
	NO_3	-			1.32240	1.00 mg/l	± 0.03 mg/l	
					1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Cell Test, 1.14556	NO_3-N	CC 10, 1.14676	2.50 mg/l	± 0.25 mg/l	1.25036	0.500 mg/l	± 0.05 mg/l	
					1.25037	2.50 mg/l	± 0.06 mg/l	1.19811
	NO_3	-			1.32240	1.00 mg/l	± 0.03 mg/l	
					1.32241	10.0 mg/l	± 0.3 mg/l	1.19811
Nitrate Test, 1.14942	NO_3-N	CC 20, 1.14675	9.0 mg/l	± 0.9 mg/l	1.25036	0.500 mg/l	± 0.05 mg/l	
					1.25037	2.50 mg/l	± 0.06 mg/l	
					1.25038	15.0 mg/l	± 0.4 mg/l	1.19811
	NO_3	-			1.32240	1.00 mg/l	± 0.03 mg/l	
					1.32241	10.0 mg/l	± 0.3 mg/l	
					1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrate Test, 1.01842	NO_3-N	-	10.0 mg/l [1)]	± 1.5 mg/l	1.32241	10.0 mg/l	± 0.3 mg/l	1.19811
	NO_3	-			1.32242	50.0 mg/l	± 2.0 mg/l	1.19811
Nitrite Cell Test, 1.14547	NO_2-N	-	0.300 mg/l [1)]	± 0.030 mg/l	1.25041	0.200 mg/l	± 0.009 mg/l	1.19899
Nitrite Cell Test, 1.00609	NO_2-N	-	45.0 mg/l [1)]	± 5 mg/l	1.25042	40.0 mg/l	± 1.3 mg/l	1.19899
Nitrite Test, 1.14776	NO_2-N	-	0.50 mg/l [1)]	± 0.05 mg/l	1.25041	0.200 mg/l	± 0.009 mg/l	1.19899
Nitrogen (total) Cell Test, 1.14537	N	CC 50, 1.14695	5.0 mg/l	± 0.7 mg/l	1.25043	2.50 mg/l	± 0.06 mg/l	
					1.25044	12.0 mg/l	± 0.3 mg/l	see prep. instruction

[1)] self prepared, recommended concentration

Test kit Cat. No. or method	Evaluation as	CombiCheck Cat. No.	Confidence interval Spec. value for the standard	Max. working tolerance	Diluted and ready-to-use standard solutions Cat. No.	Concen-tration	Expanded measurement uncertainty	Ready-to-use standard solution Cat. No.
Nitrogen (total) Cell Test, 1.00613	N	CC 50, 1.14695	5.0 mg/l	± 0.7 mg/l	1.25043 1.25044	2.50 mg/l 12.0 mg/l	± 0.06 mg/l ± 0.3 mg/l	see prep. instruction
Nitrogen (total) Cell Test, 1.14763	N	CC 70, 1.14689	50 mg/l	± 7 mg/l	1.25044 1.25045	12.0 mg/l 100 mg/l	± 0.3 mg/l ± 3 mg/l	see prep. instruction
Oxygen Cell Test, 1.14694	O_2	-	-	± 0.6 mg/l	-			see the website
Oxygen Scavengers Test, 1.19251	DEHA	-	0.250 mg/l [1)]	± 0.030 mg/l	-			see prep. instruction
Ozone Test, 1.00607	O_3	-	2.00 mg/l [1)]	± 0.20 mg/l	-			see prep. instruction
pH Cell Test, 1.01744	pH	-	7.0	± 0.2	-			109407
Phenol Cell Test, 1.14551	C_6H_5OH	-	1.25 mg/l [1)]	± 0.13 mg/l	-			see prep. instruction
Phenol Test, 1.00856	C_6H_5OH	-	2.50 mg/l [1)]	± 0.25 mg/l	-			see prep. instruction
Phosphate Cell Test, 1.00474	PO_4-P	CC 10, 1.14676	0.80 mg/l	± 0.08 mg/l	-			1.19898
Phosphate Cell Test, 1.14543	PO_4-P	CC 10, 1.14676	0.80 mg/l	± 0.08 mg/l	1.25046 1.25047	0.400 mg/l 4.00 mg/l	± 0.016 mg/l ± 0.08 mg/l	1.19898
Phosphate Cell Test, 1.00475	PO_4-P	CC 80, 1.14738 CC 20, 1.14675	15.0 mg/l 8.0 mg/l	± 1.0 mg/l ± 0.7 mg/l	-			1.19898
Phosphate Cell Test, 1.14729	PO_4-P	CC 80, 1.14738 CC 20, 1.14675	15.0 mg/l 8.0 mg/l	± 1.0 mg/l ± 0.7 mg/l	1.25047 1.25048	4.00 mg/l 15.0 mg/l	± 0.08 mg/l ± 0.4 mg/l	1.19898
Phosphate Cell Test, 1.00616	PO_4-P	-	50.0 mg/l [1)]	± 5.0 mg/l	-			1.19898
Phosphate Cell Test, 1.00673	PO_4-P	-	50.0 mg/l [1)]	± 5.0 mg/l	1.25047 1.25048 1.25049	4.00 mg/l 15.0 mg/l 75.0 mg/l	± 0.08 mg/l ± 0.4 mg/l ± 1.6 mg/l	1.19898
Phosphate Test, 1.14848	PO_4-P	CC 10, 1.14676	0.80 mg/l	± 0.08 mg/l	-			1.19898
Phosphate Test, 1.00798	PO_4-P	-	50.0 mg/l [1)]	± 5.0 mg/l	-			1.19898
Phosphate Cell Test, 1.14546	PO_4-P	-	15.0 mg/l [1)]	± 1.0 mg/l	-			1.19898
Phosphate Test, 1.14842	PO_4-P	-	15.0 mg/l [1)]	± 1.0 mg/l	-			1.19898
Potassium Cell Test, 1.14562	K	-	25.0 mg/l [1)]	± 4.0 mg/l	-			1.70230
Potassium Cell Test, 1.00615	K	-	150 mg/l [1)]	± 15 mg/l	-			1.70230
Residual Hardness Cell Test, 1.14683	Ca	-	2.50 mg/l [1)]	± 0.30 mg/l	-			1.19778
Silicate Test, 1.14794	SiO_2	-	5.00 mg/l [1)] 0.750 mg/l [1)]	± 0.50 mg/l ± 0.075 mg/l	1.32244 1.32243 1.32245	0.1000 mg/l 0.500 mg/l 1.000 mg/l	± 0.0040 mg/l ± 0.025 mg/l ± 0.030 mg/l	1.70236
Silicate Test, 1.00857	SiO_2	-	50.0 mg/l [1)]	± 5.0 mg/l	-			1.70236
Silicate Test, 1.01813	SiO_2	-	0.1000 mg/l [1)]	± 0.0100 mg/l	1.32244	0.1000 mg/l	± 0.0040 mg/l	1.70236
Silver Test, 1.14831	Ag	-	1.50 mg/l [1)]	± 0.20 mg/l	-			1.19797
Sodium Cell Test, 1.00885	Na	-	100 mg/l [1)]	± 10 mg/l	-			see prep. instruction
Sulfate Cell Test, 1.02532	SO_4	-	25.0 mg/l [1)]	± 3.0 mg/l	-			1.19813

[1)] self prepared, recommended concentration

Test kit	Evaluation	CombiCheck	Confidence interval		Diluted and ready-to-use standard solutions			Ready-to-use standard solution
Cat. No. or method	as	Cat. No.	Spec. value for the standard	Max. working tolerance	Cat. No.	Concen-tration	Expanded measurement uncertainty	Cat. No.
Sulfate Cell Test, 1.14548	SO_4	CC 10, 1.14676	100 mg/l	± 15 mg/l	1.25050 1.25051	40 mg/l 125 mg/l	± 6 mg/l ± 6 mg/l	1.19813
Sulfate Cell Test, 1.00617	SO_4	CC 10, 1.14676	100 mg/l	± 15 mg/l	1.25051 1.25052	125 mg/l 400 mg/l	± 6 mg/l ± 20 mg/l	1.19813
Sulfate Cell Test, 1.14564	SO_4	CC 20, 1.14675	500 mg/l	± 75 mg/l	1.25051 1.25052 1.25053	125 mg/l 400 mg/l 800 mg/l	± 6 mg/l ± 20 mg/l ± 27 mg/l	1.19813
Sulfate Test, 1.14791	SO_4	CC 10, 1.14676	100 mg/l	± 15 mg/l	1.25050 1.25051	40 mg/l 125 mg/l	± 6 mg/l ± 6 mg/l	1.19813
Sulfate Test, 1.01812	SO_4	-	5.00 mg/l [1)]	± 0.50 mg/l	-			1.19813
Sulfate Test, 1.02537	SO_4	CC 10, 1.14676	100 mg/l	± 15 mg/l	1.25050 1.25051	40 mg/l 125 mg/l	± 6 mg/l ± 6 mg/l	1.19813
Sulfide Test, 1.14779	S	-	0.75 mg/l [1)]	± 0.08 mg/l	-			see prep. instruction
Sulfite Cell Test, 1.14394	SO_3	-	12.5 mg/l [1)]	± 1.5 mg/l	-			see prep. instruction
Sulfite Test, 1.01746	SO_3	-	30.0 mg/l [1)]	± 1.0 mg/l	-			see prep. instruction
Surfactants (anionic) Cell Test, 1.02552	SDAS	-	1.00 mg/l [1)]	± 0.20 mg/l	-			see prep. instruction
Surfactants (cationic) Cell Test, 1.01764	k-Ten	-	1.00 mg/l [1)]	± 0.10 mg/l	-			see prep. instruction
Surfactants (nonionic) Cell Test, 1.01787	n-Ten	-	4.00 mg/l [1)]	± 0.40 mg/l	1.33022 1.33023	1.00 mg/l 5.00 mg/l	± 0.16 mg/l ± 0.30 mg/l	see prep. instruction
Tin Cell Test, 1.14622	Sn	-	1.25 mg/l [1)]	± 0.13 mg/l	-			see prep. instruction
Tin Cell Test, 1.17265	Sn	-	1.25 mg/l [1)]	± 0.13 mg/l	-			see prep. instruction
TOC Cell Test, 1.14878	TOC	-	40.0 mg/l [1)]	± 3.0 mg/l	1.32247 1.32248 1.32249	10.0 mg/l 25.0 mg/l 50.0 mg/l	± 0.2 mg/l ± 0.5 mg/l ± 1.0 mg/l	1.09017
TOC Cell Test, 1.14879	TOC	-	400 mg/l [1)]	± 30 mg/l	1.32251 1.32252 1.32253	100 mg/l 200 mg/l 500 mg/l	± 2 mg/l ± 4 mg/l ± 10 mg/l	1.09017
Total Hardness Cell Test, 1.00961	Ca	-	75 mg/l [1)]	± 7 mg/l	-			see prep. instruction
Volatile Organic Acids Cell Test, 1.01749	CH_3COOH	-	1500 mg/l [1)]	± 80 mg/l	-			see prep. instruction
Volatile Organic Acids Test, 1.01809	CH_3COOH	-	1500 mg/l [1)]	± 80 mg/l	-			see prep. instruction
Zinc Cell Test, 1.00861	Zn	CC 100, 1.18701	0.750 mg/l	± 0.150 mg/l	-			1.19806
Zinc Cell Test, 1.14566	Zn	-	2.00 mg/l [1)]	± 0.40 mg/l	-			1.19806
Zinc Test, 1.14832	Zn	CC 100, 1.18701	0.75 mg/l	± 0.15 mg/l	-			1.19806

[1)] self prepared, recommended concentration

Analytical Procedures and Appendices

IV Instructions for the preparation of standard solutions

Standard solution of acid capacity

Preparation of a standard solution:
A sodium hydroxide solution of 0.1 mol/l (corresponds to 100 mmol/l) is used.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the diluted investigational solutions remain stable for one week.

Reagents required:

1.09141.1000	Sodium hydroxide solution 0.1 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of bromine analogous to DIN EN ISO 7393

Preparation of a KIO_3 stock solution:
Dissolve 1.006 g of KIO_3 in 250 ml of distilled water in a calibrated or conformity-checked 1000-ml volumetric flask. Subsequently make up to the mark with distilled water.

Preparation of a KIO_3/KI standard solution:
Transfer 11.13 ml of the KIO_3 stock solution to a calibrated or conformity-checked 1000-ml volumetric flask, add approx. 1 g of KI and make up to the mark with distilled water.
1 ml of this solution is equivalent to 0.025 mg of bromine.

Preparation of a bromine standard solution:
Pipette 20.0 ml (full pipette) KIO_3/KI standard solution into a calibrated or conformity-checked 100-ml volumetric flask, add 2.0 ml of H_2SO_4 0.5 mol/l, leave to stand for 1 minute, and then add NaOH 2 mol/l dropwise (approx. 1 ml) until the solution just loses its color. Subsequently make up the solution to the mark with distilled water.
The concentration of the solution is 5.00 mg/l bromine.

Stability:
The KIO_3 stock solution remains stable for 4 weeks when stored in a cool place (refrigerator). The KIO_3/KI standard solution can be used for 5 hours when stored in a cool place (refrigerator). The diluted bromine standard solution is not stable and must be used immediately.

Reagents required:

1.02404.0100	Potassium iodate, volum. standard
1.05043.0250	Potassium iodide for analysis EMSURE®
1.09072.1000	Sulfuric acid 0.5 mol/l Titripur®
1.09136.1000	Sodium hydroxide solution 2 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of calcium

Preparation of a standard solution:
Dissolve 2.946 g of calcium nitrate tetrahydrate with distilled water in a calibrated or conformity-checked 500-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l calcium.

Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.

Stability:
The standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.02121.0500	Calcium nitrate tetrahydrate for analysis EMSURE®
1.16754.9010	Water for analysis EMSURE®

Standard solutions of free chlorine

All standard solutions described here for free chlorine yield <u>equivalent</u> results and are identically suited for the determination of chlorine.

Standard solution of free chlorine

Preparation of a standard solution:
Dissolve 1.85 g of dichloroisocyanuric acid sodium salt dihydrate GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l free chlorine.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Note:
This is a standard solution that can be prepared particularly rapidly and easily.

Reagents required:

1.10888.0250	Dichloroisocyanuric acid sodium salt GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of free chlorine analogous to DIN EN ISO 7393

Preparation of a KIO_3 stock solution:
Dissolve 1.006 g of KIO_3 in 250 ml of distilled water in a calibrated or conformity-checked 1000-ml volumetric flask. Subsequently make up to the mark with distilled water.

Preparation of a KIO_3/KI standard solution:
Transfer 15.00 ml (5.00 ml) of the KIO_3 stock solution to a calibrated or conformity-checked 1000-ml volumetric flask, add approx. 1 g of KI and make up to the mark with distilled water.
1 ml of this solution is equivalent to 0.015 mg (0.05 mg) of free chlorine.

Preparation of a chlorine standard solution:
Pipette 20.0 ml (10.0 ml) (full pipette) KIO_3/KI standard solution into a calibrated or conformity-checked 100-ml volumetric flask, add 2.0 ml of H_2SO_4 0.5 mol/l, leave to stand for 1 minute, and then add NaOH 2 mol/l dropwise (approx. 1 ml) until the solution just loses its color. Subsequently make up the solution to the mark with distilled water.
The concentration of the solution is 3.00 mg/l (0.500 mg/l) free chlorine.

Stability:
The KIO_3 stock solution remains stable for 4 weeks when stored in a cool place (refrigerator). The KIO_3/KI standard solution can be used for 5 hours when stored in a cool place (refrigerator). The diluted chlorine standard solution is not stable and must be used immediately.

Note:
This procedure involves the preparation according to a standardized method.

Reagents required:

1.02404.0100	Potassium iodate, volum. standard
1.05043.0250	Potassium iodide for analysis EMSURE®
1.09072.1000	Sulfuric acid 0.5 mol/l Titripur®
1.09136.1000	Sodium hydroxide solution 2 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of free chlorine

Preparation of a stock solution:
First prepare a 1:10 dilution using a sodium hypochlorite solution containing approx. 13% of active chlorine. For this pipette 10 ml of sodium hypochlorite solution into a calibrated or conformity-checked 100-ml volumetric flask and then make up to the mark with distilled water.

Precise assay of the stock solution:
Pipette 10.0 ml of the stock solution into a 250-ml ground-glass-stoppered conical flask containing 60 ml of distilled water. Subsequently add to this solution 5 ml of hydrochloric acid 25% and 3 g of potassium iodide. Close the conical flask with the ground-glass stopper, mix thoroughly, and leave to stand for 1 minute.

Titrate the eliminated iodine with sodium thiosulfate solution 0.1 mol/l until a weakly yellow color emerges. Add 2 ml of zinc iodide-starch solution and titrate from blue to colorless.

Calculation and preparation of a standard solution:
Consumption of sodium thiosulfate solution 0.1 mol/l (ml) · 355 =
= content of free chlorine, in mg/l

Further investigational concentrations may be prepared from the stock solution prepared according to the procedure described above by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), a standard solution remains stable for approx. one week. The diluted standard solutions (investigational concentrations) are stable for approx. 2 hours.

Note:
This is a standard solution that is absolutely necessary for the preparation of the monochloramine standard.

Reagents required:

1.00316.1000	Hydrochloric acid 25% for analysis EMSURE®
1.05614.9025	Sodium hypochlorite solution techn. approx. 13% active chlorine
1.09147.1000	Sodium thiosulfate solution 0.1 mol/l Titripur®
1.05043.0250	Potassium iodide GR for analysis
1.05445.0500	Zinc iodide-starch solution GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of total chlorine

Preparation of a stock solution:
Dissolve 4.00 g of chloramine T GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The stock solution prepared according to this procedure has a concentration of approx. 1000 mg/l total chlorine.

Precise assay of the stock solution:
Pipette 10.0 ml of the stock solution into a 250-ml ground-glass-stoppered conical flask containing 60 ml of distilled water. Subsequently add to this solution 5 ml of hydrochloric acid 25% and 3 g of potassium iodide. Close the conical flask with the ground-glass stopper, mix thoroughly, and leave to stand for 1 minute.

Titrate the eliminated iodine with sodium thiosulfate solution 0.1 mol/l until a weakly yellow color emerges. Add 2 ml of zinc iodide-starch solution and titrate from blue to colorless.

Calculation and preparation of a standard solution:
Consumption of sodium thiosulfate solution 0.1 mol/l (ml) · 355 =
= content of free chlorine, in mg/l

Further investigational concentrations may be prepared from the stock solution prepared according to the procedure described above by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the stock solution of approx. 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.00316.1000	Hydrochloric acid 25% for analysis EMSURE®
1.02426.0250	Chloramine T trihydrate GR for analysis
1.09147.1000	Sodium thiosulfate solution 0.1 mol/l Titripur®
1.05043.0250	Potassium iodide GR for analysis
1.05445.0500	Zinc iodide-starch solution GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of chlorine dioxide analogous to DIN EN ISO 7393

Preparation of a KIO_3 stock solution:
Dissolve 1.006 g of KIO_3 in 250 ml of distilled water in a calibrated or conformity-checked 1000-ml volumetric flask. Subsequently make up to the mark with distilled water.

Preparation of a KIO_3/KI standard solution:
Transfer 13.12 ml of the KIO_3 stock solution to a calibrated or conformity-checked 1000-ml volumetric flask, add approx. 1 g of KI and make up to the mark with distilled water.
1 ml of this solution is equivalent to 0.025 mg of chlorine dioxide.

Preparation of a chlorine dioxide standard solution:
Pipette 20.0 ml (full pipette) KIO_3/KI standard solution into a calibrated or conformity-checked 100-ml volumetric flask, add 2.0 ml of H_2SO_4 0.5 mol/l, leave to stand for 1 minute, and then add NaOH 2 mol/l dropwise (approx. 1 ml) until the solution just loses its color. Subsequently make up the solution to the mark with distilled water.
The concentration of the solution is 5.00 mg/l chlorine dioxide.

Stability:
The KIO_3 stock solution remains stable for 4 weeks when stored in a cool place (refrigerator). The KIO_3/KI standard solution can be used for 5 hours when stored in a cool place (refrigerator). The diluted chlorine dioxide standard solution is not stable and must be used immediately.

Reagents required:

1.02404.0100	Potassium iodate, volum. standard
1.05043.0250	Potassium iodide for analysis EMSURE®
1.09072.1000	Sulfuric acid 0.5 mol/l Titripur®
1.09136.1000	Sodium hydroxide solution 2 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of COD

Preparation of a standard solution:
Dissolve 0.851 g of potassium hydrogen phthalate GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l COD.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution remains stable for one month. When stored under appropriate cool conditions (refrigerator), the diluted standard solutions (investigational concentrations) remain stable – depending on the respective concentration – for approx. one week to one month.

Reagents required:

1.02400.0080	Potassium hydrogen phthalate GR for analysis, volum. standard
1.16754.9010	Water for analysis EMSURE®

Standard solution COD/chloride

Preparation of a chloride dilution solution:
Dissolve 32.9 g of sodium chloride (free from organic material, e. g. Suprapur®) with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The dilution solution prepared according to this procedure has a concentration of 20 g/l Cl^-

Preparation of a COD/chloride standard solution:
Dissolve 0.851 g of potassium hydrogen phthalate GR with **dilution solution** in a calibrated or conformity-checked 100-ml volumetric flask and make up to the mark with **dilution solution**.
The standard solution prepared according to this procedure has a concentration of 10 000 mg/l COD and 20 g/l Cl^-.

Further investigational concentrations may be prepared from this stock solution by diluting accordingly with **dilution solution**.

Stability:
When stored in a cool place (refrigerator), the dilution solution of 20 g/l Cl^- and the standard solution of 10 000 mg/l COD / 20 g/l Cl^- remain stable for one month. When stored under appropriate cool conditions (refrigerator), the diluted standard solutions (investigational concentrations) remain stable - depending on the respective concentration - for approximately one week to one month.

Reagents required:

1.02400.0080	Potassium hydrogen phthalate GR for analysis, volum. standard
1.06406.0050	Sodium chloride 99.99 Suprapur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of cyanuric acid

Preparation of a standard solution:
Dissolve 1.00 g of cyanuric acid with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The substance is slightly soluble and the dissolution process may take several hours.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l cyanuric acid.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

8.20358.0005	Cyanuric acid for synthesis
1.16754.9010	Water for analysis EMSURE®

Standard solution of formaldehyde

Preparation of a stock solution:
In a calibrated or conformity-checked 1000-ml volumetric flask make up 2.50 ml of formaldehyde solution min. 37 % GR to the mark with distilled water.
The stock solution prepared according to this procedure has a concentration of approx. 1000 mg/l formaldehyde.

Precise assay of the stock solution:
Pipette 40.0 ml (full pipette) of the formaldehyde stock solution into a 300-ml ground-glass conical flask and add 50.0 ml (buret) of iodine solution 0.05 mol/l and 20 ml of sodium hydroxide solution 1 mol/l.

Leave to stand for 15 minutes and subsequently add 8 ml of sulfuric acid 25 %. Subsequently titrate with sodium thiosulfate solution 0.1 mol/l until the yellow iodine color has disappeared, add 1 ml of zinc iodide-starch solution, and continue to titrate until a milky, pure white color emerge.

Calculation and preparation of a standard solution:
C1 = consumption of sodium thiosulfate solution 0.1 mol/l (ml)
C2 = quantity of iodine solution 0.05 mol/l (50.0 ml)

mg/l formaldehyde = (C2 – C1) · 37.525

Further investigational concentrations may be prepared from the stock solution prepared according to the procedure described above by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the stock solution of approx. 1000 mg/l remains stable for one week. After this time, the stock solution must be determined anew. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.04003.1000	Formaldehyde solution min. 37% GR for analysis
1.09099.1000	Iodine solution 0.05 mol/l Titripur®
1.09147.1000	Sodium thiosulfate solution 0.1 mol/l Titripur®
1.09137.1000	Sodium hydroxide solution 1 mol/l Titripur®
1.00716.1000	Sulfuric acid 25% for analysis EMSURE®
1.05445.0500	Zinc iodide-starch solution GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of hydrazine

Preparation of a standard solution:
Dissolve 4.07 g of hydrazinium sulfate GR with oxygen-low (boil previously) distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with oxygen-low distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l hydrazine.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with oxygen-low distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.04603.0100	Hydrazinium sulfate GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of hydrogenperoxide

Preparation of a stock solution:
Place 10.0 ml of Perhydrol® 30 % H_2O_2 in a calibrated or conformity-checked 100-ml volumetric flask and make up to the mark with distilled water. Transfer 30.0 ml (full pipette) of this solution to a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The stock solution prepared according to this procedure has a concentration of approx. 1000 mg/l hydrogenperoxide.

Precise assay of the stock solution:
Pipette 50.0 ml (full pipette) of the hydrogen peroxide stock solution into a 500-ml conical flask, dilute with 200 ml of distilled water, and add 30 ml of sulfuric acid 25 %.
Titrate with a 0.02 mol/l potassium permanganate solution until the color changes to pink.

Calculation and preparation of a standard solution:
Consumption of potassium permanganate solution 0.02 mol/l (ml) · 34.02 = = content of hydrogenperoxide, in mg/l

Further investigational concentrations may be prepared from the stock solution exactly determined according to the procedure described above by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the stock solution of approx. 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.09122.1000	Potassium permanganate solution 0.02 mol/l Titripur®
1.07209.0250	Perhydrol® 30% for analysis EMSURE®
1.00716.1000	Sulfuric acid 25% for analysis EMSURE®
1.16754.9010	Water for analysis EMSURE®

Standard solution of iodine analogous to DIN EN ISO 7393

Preparation of a KIO_3 stock solution:
Dissolve 1.006 g of KIO_3 in 250 ml of distilled water in a calibrated or conformity-checked 1000-ml volumetric flask. Subsequently make up to the mark with distilled water.

Preparation of a KIO_3/KI standard solution:
Transfer 7.00 ml of the KIO_3 stock solution to a calibrated or conformity-checked 1000-ml volumetric flask, add approx. 1 g of KI and make up to the mark with distilled water.
1 ml of this solution is equivalent to 0.025 mg of iodine.

Preparation of a iodine standard solution:
Pipette 20.0 ml (full pipette) KIO_3/KI standard solution into a calibrated or conformity-checked 100-ml volumetric flask, add 2.0 ml of H_2SO_4 0.5 mol/l, leave to stand for 1 minute, and then add NaOH 2 mol/l dropwise (approx. 1 ml) until the solution just loses its color. Subsequently make up the solution to the mark with distilled water.
The concentration of the solution is 5.00 mg/l iodine.

Stability:
The KIO_3 stock solution remains stable for 4 weeks when stored in a cool place (refrigerator). The KIO_3/KI standard solution can be used for 5 hours when stored in a cool place (refrigerator). The diluted iodine standard solution is not stable and must be used immediately.

Reagents required:

1.02404.0100	Potassium iodate, volum. standard
1.05043.0250	Potassium iodide for analysis EMSURE®
1.09072.1000	Sulfuric acid 0.5 mol/l Titripur®
1.09136.1000	Sodium hydroxide solution 2 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of magnesium

Preparation of a standard solution:
Dissolve 1.055 g of magnesium nitrate hexahydrate with distilled water in a calibrated or conformity-checked 100-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l magnesium.

Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.

Stability:
The standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.05853.0500	Magnesium nitrate hexahydrate for analysis EMSURE®
1.16754.9010	Water for analysis EMSURE®

Standard solution of monochloramine

Preparation of a standard solution:
Place 5.0 ml of chlorine standard solution 100 mg/l Cl_2 and 10.0 ml ammonium standard solution 10 mg/l NH_4-N in a calibrated or conformity-checked 100-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 5.00 mg/l free chlorine or 3.63 mg/l monochloramine.

Stability:
The standard solution is not stable and must be used immediately.

Reagents required:

	Chlorine standard solution 100 mg/l Cl_2 Preparation see "Standard solution of free chlorine" with hypochlorite solution (standard solution that is absolutely necessary for the preparation of the monochloramine standard)
	Ammonium standard solution 10 mg/l NH_4-N Preparation with Ammonium standard solution Certipur®, Cat.No. 1.19812.0500, 1000 mg/l NH_4 = 777 mg/l NH_4-N
1.16754.9010	Water for analysis EMSURE®

Standard solution of nitrogen (total)

Preparation of a standard solution:
Dissolve 5.36 g of glycine GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l total nitrogen.

Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.04201.0100	Glycine GR for analysis
1.16754.9010	Water for analysis EMSURE®

I

Standard solution of oxygen scavengers

Preparation of a standard solution:
Dissolve 1.00 g of N,N-diethylhydroxylamine with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l N,N-diethylhydroxylamine (DEHA).

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l and the diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

8.18473.0050	N,N-Diethylhydroxylamine for synthesis
1.16754.9010	Water for analysis EMSURE®

II

Standard solution of ozone analogous to DIN EN ISO 7393

Preparation of a KIO_3 stock solution:
Dissolve 1.006 g of KIO_3 in 250 ml of distilled water in a calibrated or conformity-checked 1000-ml volumetric flask. Subsequently make up to the mark with distilled water.

Preparation of a KIO_3/KI standard solution:
Transfer 14.80 ml of the KIO_3 stock solution to a calibrated or conformity-checked 1000-ml volumetric flask, add approx. 1 g of KI and make up to the mark with distilled water.
1 ml of this solution is equivalent to 0.010 mg of ozone.

Preparation of a ozone standard solution:
Pipette 20.0 ml (full pipette) KIO_3/KI standard solution into a calibrated or conformity-checked 100-ml volumetric flask, add 2.0 ml of H_2SO_4 0.5 mol/l, leave to stand for 1 minute, and then add NaOH 2 mol/l dropwise (approx. 1 ml) until the solution just loses its color. Subsequently make up the solution to the mark with distilled water.
The concentration of the solution is 2.00 mg/l ozone.

Stability:
The KIO_3 stock solution remains stable for 4 weeks when stored in a cool place (refrigerator). The KIO_3/KI standard solution can be used for 5 hours when stored in a cool place (refrigerator). The diluted ozone standard solution is not stable and must be used immediately.

Reagents required:

1.02404.0100	Potassium iodate, volum. standard
1.05043.0250	Potassium iodide for analysis EMSURE®
1.09072.1000	Sulfuric acid 0.5 mol/l Titripur®
1.09136.1000	Sodium hydroxide solution 2 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

III

IV

Standard solution of phenol

Preparation of a standard solution:
Dissolve 1.00 g of phenol GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l phenol.

Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.00206.0250	Phenol GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of silicate

Preparation of a standard solution:
A silicon standard solution of 1000 mg/l Si is used.
1000 mg/l Si corresponds to 2139 mg/l SiO_2.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Example:
Mix 4.675 ml of silicon standard solution (1000 mg/l Si) with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 10.00 mg/l SiO_2.

After its preparation, the solution must be immediately transferred to a clean polyethylene vessel for further storage.
Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.
After its preparation, the solution with the desired working concentration must be immediately transferred to a clean polyethylene vessel for further storage.

Stability:
The diluted standard solutions (investigational concentrations) remain stable - depending on the respective concentration - for one day to approximately six months.

Reagents required:

1.70236.0100	Silicone standard solution Certipur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of sodium

Preparation of a standard solution:
A chloride standard solution of 1000 mg/l is used.
1000 mg/l chloride corresponds to 649 mg/l sodium.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the diluted standard solutions (investigational concentrations) remain stable for one month.

Reagents required:

1.19897.0500	Chloride standard solu-tion Certipur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of sulfide

Preparation of a stock solution:
Dissolve 7.5 g of glass-clear, if necessary washed crystals of sodium sulfide nonahydrate GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The stock solution prepared according to this procedure has a concentration of approx. 1000 mg/l sulfide.

Precise assay of the stock solution:
Place 100 ml of distilled water and 5.0 ml (full pipette) of sulfuric acid 25% in a 500-ml ground-glass-stoppered conical flask.
To this solution add 25.0 ml (full pipette) of the sulfide stock solution and 25.0 ml (full pipette) of iodine solution 0.05 mol/l. Shake the contents of the flask
thoroughly for about 1 minute, subsequently titrate with sodium thiosulfate solution 0.1 mol/l until the yellow iodine color has disappeared, add 1 ml of zinc iodide-starch solution, and continue to titrate until a milky, pure white color emerges.

Calculation and preparation of a standard solution:
C1 = consumption of sodium thiosulfate 0.1 mol/l (ml)
C2 = quantity of iodine solution 0.05 mol/l (25.0 ml)

$$mg/l\ sulfide = (C2 - C1) \cdot 64.13$$

Further investigational concentrations may be prepared from the stock solution prepared according to the procedure described above by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the stock solution of approx. 1000 mg/l remains stable for at most one day. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

	Sodium sulfide nonahydrat GR for analysis
1.09099.1000	Iodine solution 0.05 mol/l Titripur®
1.09147.1000	Sodium thiosulfate solution 0.1 mol/l Titripur®
1.00716.1000	Sulfuric acid 25% for analysis EMSURE®
1.05445.0500	Zinc iodide-starch solution GR for analysis
1.16754.9010	Water for analysis EMSURE®

Standard solution of sulfite

Preparation of a stock solution:
Dissolve 1.57 g of sodium sulfite and 0.4 g of Titriplex® III GR with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of approx. 1000 mg/l sulfite.

Precise assay of the stock solution:
Place 50.0 ml (full pipette) of the sulfite stock solution and 5.0 ml (full pipette) of hydrochloric acid 25 % in a 300-ml conical flask.
To this solution add 25.0 ml (full pipette) of iodine solution 0.05 mol/l and process immediately. After mixing the contents of the flask, subsequently titrate with sodium thiosulfate solution 0.1 mol/l until the yellow iodine color has disappeared, add 1 ml of zinc iodide-starch solution, and continue to titrate from blue to colorless.

Calculation and preparation of a standard solution:
C1 = consumption of sodium thiosulfate 0.1 mol/l (ml)
C2 = quantity of iodine solution 0.05 mol/l (25.0 ml)

mg/l sulfite = (C2 – C1) · 80.06

Further investigational concentrations may be prepared from the stock solution exactly determined according to the procedure described above by diluting accordingly with distilled water and buffer solution pH 9.00.
This is done in the following manner:
Withdraw the desired aliquot from the stock solution, place in a calibrated or conformity-approved 1000-ml volumetric flask, add 20 ml of buffer solution pH 9.00, make up to the mark with distilled water, and mix.

Stability:
When stored in a cool place (refrigerator), the stock solution of approx. 1000 mg/l remains stable for at most one day. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.06657.0500	Sodium sulfite anhydrous for analysis EMSURE®
1.08418.0100	Titriplex® III GR for analysis
1.09099.1000	Iodine solution 0.05 mol/l Titripur®
1.09147.1000	Sodium thiosulfate solution 0.1 mol/l Titripur®
1.00316.1000	Hydrochloric acid 25% GR for analysis EMSURE®
1.05445.0500	Zinc iodide-starch solution GR for analysis
1.09461.1000	Buffer solution pH 9.00 Certipur®
1.16754.9010	Water for analysis EMSURE®

Standard solution of surfactants (anionic)

Preparation of a standard solution:
Dissolve 1.00 g of dodecane-1-sulfonic acid sodium salt with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l anionic surfactant.

Further investigational concentrations may be prepared from this standard solu-tion by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l remains stable for one month. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.12146.0005	Dodecane-1-sulfonic acid sodium salt
1.16754.9010	Water for analysis EMSURE®

I

Standard solution of surfactants (cationic)

Preparation of a standard solution:
Dissolve 1.00 g of Cetyltrimethylammonium Bromide, Molecular Biology Grade with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l cationic surfactant.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l remains stable for one month. The diluted standard solutions (investigational concentrations) must be used immediately..

Reagents required:

219374	Cetyltrimethylammonium Bromide, Molecular Biology Grade Calbiochem® (**CTAB**)
1.16754.9010	Water for analysis EMSURE®

II

Standard solution of surfactants (nonionic)

Preparation of a standard solution:
Dissolve 1.00 g of Triton™ X-100 with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l nonionic surfactant.

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
When stored in a cool place (refrigerator), the standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.12298.0101	Triton™ X-100
1.16754.9010	Water for analysis EMSURE®

III

Standard solution of tin

Preparation of a standard solution:
A tin standard solution of 1000 mg/l is used.
Transfer 30 ml of HCl 1 mol/l to a calibrated or conformity-checked 100-ml volumetric flask, add 10.0 ml (full pipette) of the tin standard solution, and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 100 mg/l tin.

Further investigational concentrations may be prepared from the standard solution by diluting accordingly with distilled water and HCl 1 mol/l.
This is done in the following manner:
Transfer 1 ml of HCl 1 mol/l to a calibrated or conformity-checked 100-ml volumetric flask. Withdraw the desired aliquot from the tin standard solution 100 mg/l, add, make up to the mark with distilled water, and mix.

Stability:
The tin standard solution 100 mg/l remains stable for 30 minutes. The diluted standard solutions (investigational concentrations) must be used immediately.

Reagents required:

1.70242.0100	Tin standard solution Certipur®
1.09057.1000	Hydrochloric acid 1 mol/l Titripur®
1.16754.9010	Water for analysis EMSURE®

IV

Standard solution of total hardness

Preparation of a standard solution:
Dissolve 2.946 g of calcium nitrate tetrahydrate with distilled water in a calibrated or conformity-checked 500-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1000 mg/l calcium (corresponds to 175 °e).

Further investigational concentrations may be prepared from this standard solution by diluting accordingly with distilled water.

Stability:
The standard solution of 1000 mg/l remains stable for one week. The diluted standard solutions (investigational concentrations) remain stable for one day.

Reagents required:

1.02121.0500	Calcium nitrate tetrahydrate for analysis EMSURE®
1.16754.9010	Water for analysis EMSURE®

Standard solution of volatile organic acids

Preparation of a standard solution:
Dissolve 2,05 g of sodium acetate anhydrous with distilled water in a calibrated or conformity-checked 1000-ml volumetric flask and make up to the mark with distilled water.
The standard solution prepared according to this procedure has a concentration of 1500 mg/l acetic acid.

Stability:
When stored in a cool place (refrigerator), the standard solution remains stable for one week.

Reagents required:

1.06268.0250	Sodium acetate anhydrous for analysis EMSURE®
1.16754.9010	Water for analysis EMSURE®

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