

Photometric tests

<i>NANOCOLOR</i> [®]	
<i>NANOCOLOR</i> [®] tube tests.....	88
<i>NANOCOLOR</i> [®] robot tests	96
<i>NANOCOLOR</i> [®] standard tests.....	98
<i>NANOCOLOR</i> [®] ECO.....	102
<i>NANOCONTROL</i>	104
<i>NANOCOLOR</i> [®] reagents for sample decomposition	110
<i>NANOCOLOR</i> [®] accessories.....	112



NANOCOLOR® tube tests

Precise rapid tests for photometric water analysis

NANOCOLOR® tube tests for photometric analysis convince by their easy handling and therefore are the first choice for routine, laboratory and process analysis. A maximum in accuracy and precision is granted for the measurement results due to exactly pre-dosed reagents in 16 mm cuvettes and additional reagents. The tests are preprogrammed in MACHEREY-NAGEL photometers and selected automatically via a barcode on the cuvette. This perfect interaction of instruments and tests lets the user experience a high measurement safety, saving time and working cost-efficiently.

Ideally packed

All NANOCOLOR® tube tests are delivered in stable boxes with color coded labels, giving all relevant information about the test at one glance. The boxes provide a perfect protection from sunlight and convenient withdrawal of test tubes and reagents. LOT-specific information are available by scanning of the 2D barcode on the back of the box. The colored pictograms in the lid, which are of special value for our customers, provide intuitive instructions on the test procedure also for inexperienced users.

The perfect test for every user

The user's choice of the correct test is the first step towards a successful analysis. MACHEREY-NAGEL offers various test kits with different measurement ranges for all typical parameters relevant in water and waste water analysis. It is recommended to choose a test kit, where the expected and measured measurement value is within the 20–80 % range of the measuring range of the used test. Here, the safety of the measurement result is at its optimum. The operator gets reliable results and safety for the reporting of his results to supervisors and towards authorities.

Good to know

Certificate



Certificates of analysis for NANOCOLOR® tube tests can be downloaded fast and convenient via www.mn-net.com/certificate.



Good to know

Via the 2D barcode on the back of the packages, LOT-specific information can be read easily.



Easy

- Colored pictograms as step-by-step instruction
- Big cuvettes for easy pipetting
- Barcoded cuvettes for automatic test selection

Safe

- Convenient withdrawal of tubes from the box
- No contact with chemicals
- Reactions based on internationally accepted standard methods

Reliable

- Precisely pre-dosed reagents
- Adequate test for every application
- Constant high quality from batch to batch

Good to know



For further information on photometers for the evaluation of NANOCOLOR® tube tests see page 12.



ISO conform COD tests

MACHEREY-NAGEL offers a complete analytical system with seven tube tests for an ISO conform COD analysis. The ISO 15705 describes the use of tube tests that are suitable for photometric evaluation and is a standardized and internationally accepted method for sewage and waste water analysis. This norm explicitly suggests to use commercial test kits.

Time-saving and reliable analysis of total nitrogen

The sum-parameter total nitrogen is of high relevance in water and waste water analysis. It gives valuable information about the grade of contaminations with e.g. ammonia, nitrite or nitrate. NANOCOLOR® total nitrogen tests impress with safe and reproducible results as well as fast and easy handling. Precisely pre-dosed reagents allow the performance of the test in only a few steps. A separate cuvette for every sample decomposition saves time and minimizes errors from cross-contaminations.

NANOCOLOR® tube tests

Ordering information

Test	REF	Measuring range NANOCOLOR® VIS II	Number of tests	Shelf life	Method	
■ Aluminum 07 ²⁾	985098	0.02–0.70 mg/L Al ³⁺	19	1 year	Eriochrome® Cyanine R	
■ Ammonium 3	985003	0.04–2.30 mg/L NH ₄ -N 0.05–3.00 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ Ammonium 10	985004	0.2–8.0 mg/L NH ₄ -N 0.2–10.0 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ Ammonium 50	985005	1–40 mg/L NH ₄ -N 1–50 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ Ammonium 100	985008	4–80 mg/L NH ₄ -N 5–100 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ Ammonium 200	985006	30–160 mg/L NH ₄ -N 40–200 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ Ammonium 2000	985002	300–1600 mg/L NH ₄ -N 400–2000 mg/L NH ₄ ⁺	20	1 year	Indophenol	
■ AOX 3	985007	0.1–3.0 mg/L AOX 0.01–0.30 mg/L AOX	20	1 year	Mercury(II)-thiocyanate / Iron(III)-nitrate	
■ BOD ₅ (in Winkler bottles)	985822	2–3000 mg/L O ₂	25–50	2 years	Winkler	
■ BOD ₅ -TT	985825	0.5–3000 mg/L O ₂	22	2 years	Winkler	
■ Cadmium 2	985014	0.05–2.00 mg/L Cd ²⁺	10–19	1 year	Cadion	
■ Carbonate hardness 15	985015	1.25–18.75 °e 0.4–5.4 mmol/L H ⁺	20	1 year	Bromphenol blue	
■ Chloride 50	985021	0.5–50.0 mg/L Cl ⁻	20	1 year	Mercury(II)-thiocyanate / Iron(III)-nitrate	
■ Chloride 200	985019	5–200 mg/L Cl ⁻ 0.10–1.00 g/L Cl ⁻	20	1 year	Mercury(II)-thiocyanate / Iron(III)-nitrate	
■ Chlorine / Ozone 2	985017	0.05–2.50 mg/L Cl ₂ 0.05–2.00 mg/L O ₃	20	1 year	DPD	
■ Chlorine dioxide 5	985018	0.15–5.00 mg/L ClO ₂	20	1 year	DPD	
■ Chromate 5	985024	0.05–2.00 mg/L Cr(VI) 0.005–0.500 mg/L Cr(VI) ¹⁾ 0.1–4.0 mg/L CrO ₄ ²⁻ 0.01–1.00 mg/L CrO ₄ ²⁻¹⁾	20	2 years	Carbazide	
■ total Chromium 2	985059	0.05–2.00 mg/L Cr 0.005–0.500 mg/L Cr ¹⁾	20	2 years	Carbazide	
■ COD 40	ISO 15705	985027	2–40 mg/L O ₂	20	1 year (2–8 °C)	Potassium dichromate
■ COD 60	ISO 15705	985022	5–60 mg/L O ₂	20	1 year (2–8 °C)	Potassium dichromate
■ COD 60 in salt water		985020	6–60 mg/L O ₂	20	1 year (2–8 °C)	Potassium dichromate
■ COD 160	ISO 15705	985026	15–160 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 160 Hg-free		963026	15–160 mg/L O ₂	20	1 year (2–8 °C)	Potassium dichromate
■ COD 300		985033	50–300 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 600	ISO 15705	985030	50–600 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 1500	ISO 15705	985029	100–1500 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 1500 Hg-free		963029	100–1500 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 4000		985011	400–4000 mg/L O ₂	20	1 year	Potassium dichromate
■ COD 10000		985023	1.00–10.00 g/L O ₂	20	1 year	Potassium dichromate
■ COD 15000		985028	1.0–15.0 g/L O ₂	20	1 year	Potassium dichromate
■ COD 60000		985012	5.0–60.0 g/L O ₂	20	1 year	Potassium dichromate
■ COD LR 150	ISO 15705	985036	3–150 mg/L O ₂	20	1 year	Potassium dichromate

Photometric tests

On other photometers than the NANOCOLOR® VIS II measurement ranges and wavelengths can be different.

¹⁾ A more sensitive measuring range is possible by using semi-micro cuvettes 50 mm (REF 91950).

²⁾ Decomposition only possible in microwave.

³⁾ Special filter can be necessary for filter photometers (Formaldehyde 10: 412 nm, Tin 3: 520 nm).

⁴⁾ Without barcode.

⁵⁾ Please see the instruction leaflet.

⁶⁾ This test can be performed without a NANOCOLOR® reagent set. Determination only with NANOCOLOR® spectrophotometers and the PF-12^{Plus}.

⁷⁾ Additionally required with first order: NANOCOLOR® TIC-Ex (REF 916993).

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® tube tests

	Spectrophotometer	PF-12 ^{plus}	PF-3 COD	PF-3 Drinking Water	PF-3 Fish	PF-3 Pool	PF-3 Soil	NanoOx N	NanoOx Metal	Crack set	Sea water ⁵⁾	GHS	Test
■	■								■		■		Aluminum 07 ²⁾
■	■			■		■					■	■	Ammonium 3
■	■					■					■	■	Ammonium 10
■	■					■					■	■	Ammonium 50
■	■										■	■	Ammonium 100
■	■										■	■	Ammonium 200
■	■										■	■	Ammonium 2000
■	■										■	■	AOX 3
■	■										■	■	BOD ₅ (in Winkler bottles)
■	■										■	■	BOD ₅ -TT
■	■							■	■		■		Cadmium 2
■	■										■		Carbonat hardness 15
■	■											■	Chloride 50
■	■										■	■	Chloride 200
■	■		■		■						■		Chlorine / Ozone 2
■	■										■		Chlorine dioxide 5
■	■							■			■		Chromate 5
■	■											■	total Chromium 2
■	■	■										■	COD 40
■	■	■										■	COD 60
■	■	■									■		COD 60 in salt water
■	■	■										■	COD 160
■	■											■	COD 160 Hg-free
■	■											■	COD 300
■	■	■										■	COD 600
■	■	■										■	COD 1500
■	■	■										■	COD 1500 Hg-free
■	■	■										■	COD 4000
■	■	■										■	COD 10000
■	■	■										■	COD 15000
■	■	■										■	COD 60000
■	■	■										■	COD LR 150

NANOCOLOR® tube tests

Test	REF	Measuring range NANOCOLOR® VIS II	Number of tests	Shelf life	Method
■ COD HR 1500 ISO 15705	985038	20–1500 mg/L O ₂	20	1 year	Potassium dichromate
■ org. Complexing agents 10	985052	0.5–15.0 mg/L I _{BIC} 0.5–20.0 mg/L EDTA	10–19	1 year	Bismut xylenol orange
■ Copper 5	985053	0.10–7.00 mg/L Cu ²⁺	20	2 years	Cuprizone
■ Easily liberated Cyanide 04	985025	0.01–0.40 mg/l CN ⁻	19	1 year	Barbituric acid derivative
■ Cyanide 08	985031	0.02–0.80 mg/L CN ⁻ 0.005–0.100 mg/L CN ⁻¹)	20	1 year	Barbituric acid / Pyridine
■ DEHA 1 (Diethylhydroxylamine)	985035	0.05–1.00 mg/L DEHA	20	1 year	Redox reaction
■ Ethanol 1000	985838	0.10–1.00 g/L EtOH 0.013–0.130 Vol. % EtOH	23	2 years (< 0 °C)	Alcoholoxidase / Peroxidase
■ Fluoride 2	985040	0.1–2.0 mg/L F ⁻	20	1.5 years	Lanthanum-Alizarine complexone
■ Formaldehyde 8	985041	0.1–8.0 mg/L HCHO	20	2 years	Chromotropic acid
■ Formaldehyde 10 ³⁾	985046	0.20–10.00 mg/L HCHO 0.02–1.00 mg/L HCHO ¹⁾	20	2 years	Acetylacetone
■ Hardness Ca / Mg	985044	1.25–25.00 °e 0.2–3.6 mmol/L	20	1.5 years	Phthalein purple
■ Hardness 20	985043	1.25–25.00 °e 0.2–3.6 mmol/L	20	1.5 years	Phthalein purple
■ HC 300 (Hydrocarbons)	985057	0.5–5.6 mg/L HC 30–300 mg/kg HC	20	1 year	Potassium dichromate
■ Iron 3	985037	0.10–3.00 mg/L Fe 0.02–1.00 mg/L Fe ¹⁾	20	1 year	Diphenylpyridyltriazine
■ Lead 5	985009	0.10–5.00 mg/L Pb ²⁺	20	1 year	4-(2-Pyridyl)-(2-azo)-resorcine (PAR)
■ Manganese 10	985058	0.1–10.0 mg/L Mn 0.02–2.00 mg/L Mn ¹⁾	20	1.5 years	Formaldoxime
■ Methanol 15	985859	0.2–15.0 mg/L MeOH	23	2 year (< 0 °C)	Alcoholoxidase / Peroxidase
■ Molybdenum 40	985056	1.0–40.0 mg/L Mo(VI) 1.6–65.0 mg/L MoO ₄ ²⁻	20	2 years	Thioglycolic acid
■ Nickel 4	985071	0.10–7.00 mg/L Ni ²⁺ 0.02–1.00 mg/L Ni ^{2+ 1)}	20	2 years	Dimethylglyoxime
■ Nitrate 8	985065	0.30–8.00 mg/L NO ₃ -N 1.3–35.0 mg/L NO ₃ ⁻	20	2 years	2,6-Dimethylphenol
■ Nitrate 50	985064	0.3–22.0 mg/L NO ₃ -N 2–100 mg/L NO ₃ ⁻	20	2 years	2,6-Dimethylphenol
■ Nitrate 250	985066	4–60 mg/L NO ₃ -N 20–250 mg/L NO ₃ ⁻	20	2 years	2,6-Dimethylphenol
■ Nitrite 2	985068	0.003–0.460 mg/L NO ₂ -N 0.02–1.50 mg/L NO ₂ ⁻	20	1 year	Sulfanilic acid / 1-Naphthylamine
■ Nitrite 4	985069	0.1–4.0 mg/L NO ₂ -N 0.3–13.0 mg/L NO ₂ ⁻	20	1.5 years	Sulfanilic acid / 1-Naphthylamine
■ total Kjeldahl nitrogen TKN 16	985067	1.00–16.0 mg/L TKN	20	1.5 years	2,6-Dimethylphenol
■ total Nitrogen TN _b 22	985083	0.5–22.0 mg/L N	20	1 year	2,6-Dimethylphenol
■ total Nitrogen TN _b 60	985092	3–60 mg/L N	20	1 year	2,6-Dimethylphenol
■ total Nitrogen TN _b 220	985088	5–220 mg/L N	20	1 year	2,6-Dimethylphenol
■ Organic acids 3000	985050	30–3000 mg/L CH ₃ COOH 0.5–50.0 mmol/L CH ₃ COOH	20	1.5 years	Ethylenglycole / Iron(III)-Ions
■ Oxygen 12	985082	0.5–12.0 mg/L O ₂	22	2 years	Winkler

Photometric tests

On other photometers than the NANOCOLOR® VIS II measurement ranges and wavelengths can be different.

¹⁾ A more sensitive measuring range is possible by using semi-micro cuvettes 50 mm (REF 91950).

²⁾ Decomposition only possible in microwave.

³⁾ Special filter can be necessary for filter photometers (Formaldehyde 10: 412 nm, Tin 3: 520 nm).

⁴⁾ Without barcode.

⁵⁾ Please see the instruction leaflet.

⁶⁾ This test can be performed without a NANOCOLOR® reagent set. Determination only with NANOCOLOR® spectrophotometers and the PF-12^{20s}.

⁷⁾ Additionally required with first order: NANOCOLOR® TIC-Ex (REF 916993).

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® tube tests

	Spectrophotometer	PF-12 ^{plus}	PF-3 COD	PF-3 Drinking Water	PF-3 Fish	PF-3 Pool	PF-3 Soil	NanoOx N	NanoOx Metal	Crack set	Sea water ⁵⁾	GHS	Test
	■	■	■									■	COD HR 1500
	■	■									■		org. Complexing agents 10
	■	■							■	■			Copper 5
	■	■									■	■	Easily liberated Cyanide 04
	■	■									■	■	Cyanide 08
	■	■									■	■	DEHA 1 (Diethylhydroxylamine)
	■	■											Ethanol 1000
	■	■									■	■	Fluoride 2
	■	■										■	Formaldehyde 8
	■	■									■		Formaldehyde 10 ⁹⁾
	■	■									■		Hardness Ca / Mg
	■	■									■		Hardness 20
	■	■									■	■	HC 300 (Hydrocarbons)
	■	■							■	■	■	■	Iron 3
	■	■								■			Lead 5
	■	■									■	■	Manganese 10
	■	■											Methanol 15
	■	■										■	Molybdenum 40
	■	■							■	■	■	■	Nickel 4
	■	■										■	Nitrate 8
	■	■					■						Nitrate 50
	■	■											Nitrate 250
	■	■									■	■	Nitrite 2
	■	■									■		Nitrite 4
	■	■						■				■	total Kjeldahl nitrogen TKN 16
	■	■						■				■	total Nitrogen TN _b 22
	■	■						■				■	total Nitrogen TN _b 60
	■	■						■				■	total Nitrogen TN _b 220
	■	■									■	■	Organic acids 3000
	■	■									■	■	Oxygen 12

NANOCOLOR[®] tube tests

Test	REF	Measuring range NANOCOLOR [®] VIS II		Number of tests	Shelf life	Method
■ Peroxide 2	985871	0.03–2.00 mg/L H ₂ O ₂		10–19	1 year (2–8 °C)	Peroxidase
■ pH 6.5–8.2 ⁴⁾	91872	pH 6.5–8.2		100	1.5 years	Phenol red
■ Phenolic Index 5	985074	0.2–5.0 mg/L Phenol		20	1.5 years	4-Aminoantipyrine
■ ortho- and total Phosphate 1	985076	0.05–1.50 mg/L P 0.010–0.800 mg/L P ¹⁾	0.2–5.0 mg/L PO ₄ ³⁻ 0.03–2.50 mg/L PO ₄ ³⁻¹⁾	20	1 year	Phosphomolybdenum blue
■ ortho- and total Phosphate 5	985081	0.20–5.00 mg/L P		20	1 year	Phosphomolybdenum blue
■ ortho- and total Phosphate 15	985080	0.30–15.00 mg/L P		20	1 year	Phosphomolybdenum blue
■ ortho- and total Phosphate 45	985055	5.0–50.0 mg/L P		20	1 year	Phosphomolybdenum blue
■ ortho- and total Phosphate 50	985079	10.0–50.0 mg/L P		19	3 years	Vanadate molybdate
■ ortho- and total Phosphate LR 1	985095	0.05–0.50 mg/L P		20	1 year	Phosphomolybdenum blue
■ POC 200	985070	20–200 mg/L POC		20	1.5 years	Turbidity
■ Potassium 50	985045	2–50 mg/L K ⁺		20	2 years	Potassium tetraphenylborate (Turbidity)
■ Residual hardness 1	985084	0.03–1.25 °e		20	1 year	Phthalein purple
■ Silver 3	985049	0.20–3.00 mg/L Ag ⁺		20	1.5 years	Indicator
■ Starch 100	985085	5–100 mg/L starch		19	1 year	Iodine-starch reaction
■ Sulfate 1000	985087	200–1000 mg/L SO ₄ ²⁻		20	3 years	Barium sulfate (Turbidity)
■ Sulfate LR 200	985062	20–200 mg/L SO ₄ ²⁻		20	3 years	Barium sulfate (Turbidity)
■ Sulfate MR 400	985060	40–200 mg/L SO ₄ ²⁻		20	3 years	Barium sulfate (Turbidity)
■ Sulfate HR 1000	985063	200–1000 mg/L SO ₄ ²⁻		20	2 years	Barium sulfate (Turbidity)
■ Sulfide 3	985073	0.05–3.00 mg/L S ²⁻		20	3 years	Methylene blue
■ Sulfite 10	985089	0.2–10.0 mg/L SO ₃ ²⁻		20	1 year	Thiobenzoic acid derivative
■ Sulfite 100	985090	5–100 mg/L SO ₃ ²⁻		19	1 year	Potassium iodate / -iodide
■ Anionic surfactants 4	985032	0.20–4.00 mg/L MBAS		20	2 years	Methylene blue
■ Cationic surfactants 4	985034	0.20–4.00 mg/L CTAB		20	2 years	Disulfine blue
■ Nonionic surfactants 15	985047	0.3–15.0 mg/L Triton [®] X-100		20	2 years	TBPE
■ Thiocyanate 50	985091	0.5–50.0 mg/L SCN ⁻		20	2 years	Iron(III)-thiocyanate
■ Tin 3 ³⁾	985097	0.10–3.00 mg/L Sn		18	1 year	9-Phenyl-3-fluoron
■ TOC 30 ⁷⁾	985075	2.0–30.0 mg/L C		20	1 year (2–8 °C)	Indicator
■ TOC 300 ⁷⁾	985078	20–300 mg/L C		20	1 year (2–8 °C)	Indicator
■ TTC / Sludge activity	985890	5–150 µg TPF	0.050–2.300 A	20	2 years (2–8 °C)	2,3,5-Triphenyltetrazoliumchloride (TTC)
■ Turbidity ⁶⁾	Test 9-06	0.1–1000 NTU		–	–	Turbidity
■ Zinc 4	985096	0.10–4.00 mg/L Zn ²⁺		20	1 year	Zincon
■ Zinc 6	985042	0.20–6.00 mg/L Zn ²⁺		20	1 year	4-(2-pyridylazo)resorcinol (PAR)
■ Zirconium 100	985001	5–100 mg/L Zr		20	3 years	Indicator

Photometric tests

On other photometers than the NANOCOLOR[®] VIS II measurement ranges and wavelengths can be different.

¹⁾ A more sensitive measuring range is possible by using semi-micro cuvettes 50 mm (REF 91950).

²⁾ Decomposition only possible in microwave.

³⁾ Special filter can be necessary for filter photometers (Formaldehyde 10: 412 nm, Tin 3: 520 nm).

⁴⁾ Without barcode.

⁵⁾ Please see the instruction leaflet.

⁶⁾ This test can be performed without a NANOCOLOR[®] reagent set. Determination only with NANOCOLOR[®] spectrophotometers and the PF-12^{2)is}.

⁷⁾ Additionally required with first order: NANOCOLOR[®] TIC-Ex (REF 916993).

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® tube tests

	Spectrophotometer	PF-12 ^{plus}	PF-3 COD	PF-3 Drinking Water	PF-3 Fish	PF-3 Pool	PF-3 Soil	NanoX N	NanoX Metal	Crack set	Sea water ⁵⁾	GHS	Test
	■	■									■		Peroxide 2
	■	■		■		■					■		pH 6.5–8.2 ⁴⁾
	■	■									■	■	Phenolic index 5
	■	■							■		■	■	ortho- and total Phosphate 1
	■	■							■		■	■	ortho- and total Phosphate 5
	■	■					■		■		■	■	ortho- and total Phosphate 15
	■	■							■		■	■	ortho- and total Phosphate 45
	■	■							■		■	■	ortho- and total Phosphate 50
	■	■							■		■	■	ortho- and total Phosphate LR 1
	■	■									■		POC 200
	■	■					■				■	■	Potassium 50
	■	■											Residual hardness 1
	■	■							■				Silver 3
	■	■									■	■	Starch 100
	■	■										■	Sulfate 1000
	■	■										■	Sulfate LR 200
	■	■											Sulfate MR 400
	■	■											Sulfate HR 1000
	■	■									■	■	Sulfide 3
	■	■									■	■	Sulfite 10
	■	■									■	■	Sulfite 100
	■	■									■	■	Anionic surfactants 4
	■	■									■	■	Cationic surfactants 4
	■	■										■	Nonionic surfactants 15
	■	■									■	■	Thiocyanate 50
	■	■									■	■	Tin 3 ³⁾
	■	■										■	TOC 30
	■	■										■	TOC 300
	■	■										■	TTC / Sludge activity
	■	■									■		Turbidity ⁶⁾
	■	■							■	■	■	■	Zinc 4
	■	■							■	■	■	■	Zinc 6
	■	■							■	■	■		Zirconium 100

NANOCOLOR[®] robot tests

Fully automated water analysis

The companies MACHEREY-NAGEL and Skalar Analytical BV have collaborated on a robotic analyzer for fully automated water analysis in the laboratory.

The test kit analyzer SP2000^{series} automates all the necessary handling steps of the photometric NANOCOLOR[®] tube tests such as sample (de)-capping, pipetting, addition of reagents, mixing, heating, cooling and measurement.

The flexibility and versatility of the test kit platform is reflected in the possibility to process 48 to 192 test tubes at once by using different test tube racks. The instrument can be configured for the analysis of one test kit application or for multiple test kit applications per analysis run, such as combinations of COD, total phosphate, total nitrogen and others. The evaluation of the tests is performed on the spectrophotometer NANOCOLOR[®] VIS II which is integrated on the platform. With the software the user can define if the application should be processed sequential or parallel.

Good to know

If you are interested in automated water analysis, please do not hesitate to contact us.



Ordering information

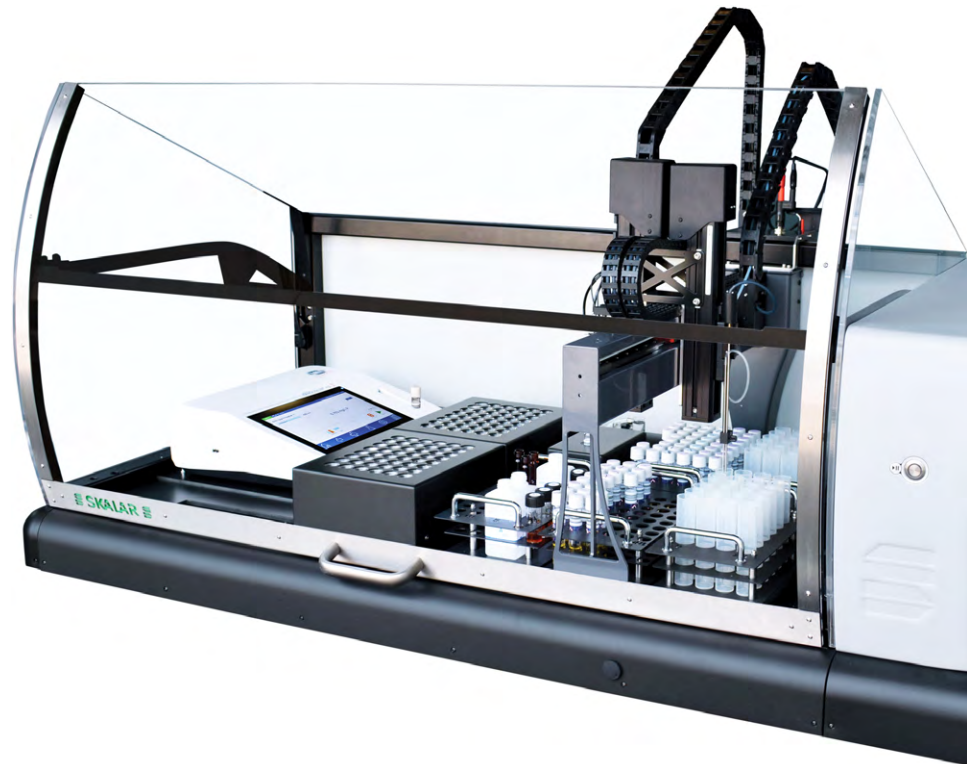
Test	REF	Measuring range NANOCOLOR [®] VIS II ¹⁾		Number of tests	Shelf life	Method
Ammonium 3	985603	0.04–2.30 mg/L NH ₄ -N	0.05–3.00 mg/L NH ₄ ⁺	20	1 year	Indophenol
Ammonium 50	985605	1–40 mg/L NH ₄ -N	1–50 mg/L NH ₄ ⁺	20	1 year	Indophenol
Chloride 50	985621	0.5–50.0 mg/L Cl ⁻		20	1 year	Mercury(II)-thiocyanate / Iron(III)-nitrate
Chloride 200	985619	5–200 mg/L Cl ⁻		20	1 year	Mercury(II)-thiocyanate / Iron(III)-nitrate
COD 60	985622	5–60 mg/L O ₂		20	1 year (2–8 °C)	Potassium dichromate
COD 160	985626	10–160 mg/L O ₂		20	1 year	Potassium dichromate
COD 600	985630	50–600 mg/L O ₂		20	1 year	Potassium dichromate
COD 1500	985629	100–1500 mg/L O ₂		20	1 year	Potassium dichromate
COD LR 150	985636	3–150 mg/L O ₂		19	1 year	Potassium dichromate
COD HR 1500	985638	20–1500 mg/L O ₂		19	1 year	Potassium dichromate
COD 15000	985628	1.0–15.0 g/L O ₂		20	1 year	Potassium dichromate
Nitrate 8	985665	0.30–8.00 mg/L NO ₃ -N	1.3–35.0 mg/L NO ₃ ⁻	20	2 years	2,6-Dimethylphenol
Nitrate 50	985664	0.3–22.0 mg/L NO ₃ -N	2–100 mg/L NO ₃ ⁻	20	2 years	2,6-Dimethylphenol
Nitrite 2	985668	0.003–0.460 mg/L NO ₂ -N	0.02–1.50 mg/L NO ₂ ⁻	20	1 year	Sulfanilic acid / 1-Naphthylamine
Nitrite 4	985669	0.1–4.0 mg/L NO ₂ -N	0.3–13.0 mg/L NO ₂ ⁻	20	1.5 years	Sulfanilic acid / 1-Naphthylamine
total Nitrogen TN _b 22	985683	0.5–22.0 mg/L N		20	1 year	2,6-Dimethylphenol
total Nitrogen TN _b 220	985688	5–220 mg/L N		20	1 year	2,6-Dimethylphenol
Organic acids 3000	985650	30–3000 mg/L CH ₃ COOH	0.5–50.0 mmol/L CH ₃ COOH	20	1.5 years	Ethylenglycole / Iron(III)-Ions
Phenolic Index 5	985674	0.2–5.0 mg/L Phenol		20	1.5 years	4-Aminoantipyrine
total Phosphate 1	985676	0.05–1.50 mg/L P	0.2–5.0 mg/L PO ₄ ³⁻	20	1 year	Phosphomolybdenum blue
total Phosphate 5	985681	0.20–5.00 mg/L P	0.5–15.0 mg/L PO ₄ ³⁻	20	1 year	Phosphomolybdenum blue
total Phosphate 15	985680	0.30–15.00 mg/L P	1.0–45.0 mg/L PO ₄ ³⁻	20	1 year	Phosphomolybdenum blue
ortho Phosphate 1	985607	0.05–1.50 mg/L P	0.2–5.0 mg/L PO ₄ ³⁻	20	1 year	Phosphomolybdenum blue
ortho Phosphate 15	985657	0.30–15.00 mg/L P	1.0–45.0 mg/L PO ₄ ³⁻	20	1 year	Phosphomolybdenum blue
Sulfide 3	985673	0.05–3.00 mg/L S ²⁻		20	3 years	Methylene blue

¹⁾ Evaluation only possible on the spectrophotometers NANOCOLOR[®] VIS II and NANOCOLOR[®] VIS.

²⁾ Please see the instruction leaflet.

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

	Sea water 2)	GH5
■	■	
■	■	
		■
■	■	
		■
		■
		■
		■
		■
		■
		■
		■
		■
		■
■	■	
■		
		■
		■
		■
		■
		■
■	■	
■	■	
		■
		■



NANOCOLOR® standard tests

High sensitivity for photometric water analysis

NANOCOLOR® standard tests are convenient reagent kits for photometric analysis. With ready-to-use reagents up to 500 determinations are possible with only one test kit, resulting in low costs per determination for the user. Even very low limits can be evaluated precisely, due to high sample volumes and the measurement in 50 mm cuvettes. An enhancement of selectivity is possible for various parameters by extraction, where potentially interfering substances remain in the aqueous phase. The colored complex with the substance of interest is extracted with an organic solvent from the aqueous phase and is then analyzed within the organic phase.

Good to know

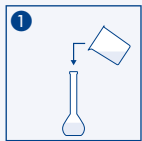
NANOCOLOR® standard tests offer maximum sensitivity and accuracy in photometric analysis.

Good to know

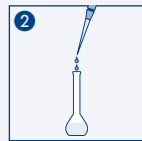
For further information on NANOCOLOR® photometers for the evaluation of NANOCOLOR® standard tests see page 12.

How it's done

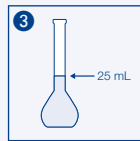
Procedure of standard tests



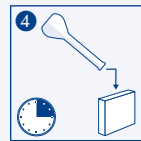
1 Fill 20 mL sample into 25 mL flask



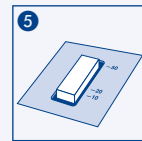
2 Add reagents



3 Fill up to 25 mL with dist. water and mix



4 After reaction time fill into cuvette



5 Measure





NANOCOLOR® standard tests

Ordering information

Test	REF	Measuring range NANOCOLOR® VIS II		Number of tests ¹⁾	Shelf life	Method
■ Aluminum ²⁾	91802	0.01–1.00 mg/L Al ³⁺		250	2 years	Eriochrome® Cyanine R
■ Ammonium	91805	0.01–2.0 mg/L NH ₄ -N	0.01–2.5 mg/L NH ₄ ⁺	100	1 year	Indophenol
■ Cadmium ³⁾	918131	0.002–0.50 mg/L Cd ²⁺		25	1.5 years	Dithizone
■ Chloride	91820	0.2–125 mg/L Cl ⁻		250	1 year	Mercury(II)-thiocyanate / iron(III)-nitrate
■ Chlorine	91816	0.02–10.0 mg/L Cl ₂		250	3 years	DPD
■ Chlorine dioxide	918163	0.04–4.00 mg/L ClO ₂		50	1.5 years	DPD
■ Chromate	91825	0.01–3.0 mg/L Cr(VI)	0.01–6.0 mg/L CrO ₄ ²⁻	250	2 years	Carbazide
■ Cobalt	91851	0.002–0.70 mg/L Co ²⁺		250	2 years	5-CI-PADAB
■ Color (Hazen/DIN) ⁴⁾	Test 1-39	5–500 mg/L Pt (Hazen)	0.2–20.0 ¹ /m	–	–	Hazen
■ Copper	91853	0.01–10.0 mg/L Cu ²⁺		250	2 years	Cuprizone
■ Cyanide	91830	0.001–0.50 mg/L CN ⁻		250	1 year	Barbituric acid / pyridine
■ Detergents, anionic	91832	0.02–5.0 mg/L MBAS		40	3 years	Methylene blue
■ Detergents, cationic	91834	0.05–5.0 mg/L CTAB		40	3 years	Bromphenol blue
■ Fluoride	918142	0.05–2.00 mg/L F ⁻		500	2 years	SPADNS
■ Hydrazine	91844	0.002–1.50 mg/L N ₂ H ₄		250	1 year	4-(Dimethylamino)-benzaldehyde
■ Iron LR	918128	0.005–5.00 mg/L Fe		250	3 years	Triazine
■ Iron	91836	0.01–15.0 mg/L Fe		250	3 years	1,10-Phenanthroline
■ Lead ³⁾	918101	0.005–1.00 mg/L Pb ²⁺		50	1.5 years	Dithizone
■ Manganese LR	918126	0.005–3.00 mg/L Mn		250	1 year	TMB
■ Manganese	91860	0.01–10.0 mg/L Mn		250	3 years	Formaloxime
■ Nickel	91862	0.01–10.0 mg/L Ni ²⁺		250	2 years	Dimethylglyoxime
■ Nitrate	91865	0.1–30.0 mg/L NO ₃ -N	0.5–140 mg/L NO ₃ ⁻	100	2 years	2,6-Dimethylphenol
■ Nitrate Z	91863	0.02–1.0 mg/L NO ₃ -N	0.1–5.0 mg/L NO ₃ ⁻	500	1.5 years	Sulfanilic acid / 1-Naphthylamine
■ Nitrite	91867	0.002–0.30 mg/L NO ₂ -N	0.005–1.00 mg/L NO ₂ ⁻	250	1.5 years	Sulfanilic acid / 1-Naphthylamine
■ Ozone	91885	0.01–1.50 mg/L O ₃		200	1 year (2–8 °C)	Indigotrisulfonate
■ Phenol	91875	0.01–7.0 mg/L Phenol		500	3 years	4-Nitroaniline
■ ortho-Phosphate	91877	0.04–6.5 mg/L PO ₄ -P	0.1–20.0 mg/L PO ₄ ³⁻	500	3 years	Phospho molybdenum blue
■ ortho-Phosphate	91878	0.2–17 mg/L PO ₄ -P	0.5–50 mg/L PO ₄ ³⁻	500	3 years	Vanadate molybdate
■ SAC ^{4) 7)}	Test 3-01	0.1–150.0 ¹ /m		–	–	–
■ Silica	91848	0.01–10.0 mg/L Si 0.002–0.1 mg/L Si ⁵⁾	0.02–10.0 mg/L SiO ₂ 0.005–0.200 mg/L SiO ₂ ⁵⁾	250	3 years	Silicomolybdenum blue
■ Sulfide	91888	0.01–3.0 mg/L S ²⁻		250	3 years	Methylene blue
■ Turbidity (Formazine/DIN) ⁴⁾	Test 1-92	1–100 TE/F (= FAU)	0.5–40.0 ¹ /m	–	–	Turbidity
■ Zinc	91895	0.02–3.0 mg/L Zn ²⁺		250	3 years	Zincon

Photometric tests

¹⁾ Maximal number of tests. The number of tests depends on the used sample volume.

²⁾ Decomposition in micro wave is possible.

³⁾ Organic phase tetrachloro ethylene p.a. or tetrachloro methane is needed additionally.

⁴⁾ No NANOCOLOR® test is necessary for this determination.

⁵⁾ Highly sensitive measurement.

⁶⁾ Please see the instruction leaflet.

⁷⁾ This test can only be performed with NANOCOLOR® UV/VIS II.

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® standard tests

	Spectrophotometer	Reduced sample volume	Simplified procedure	NanOx N	NanOx Metal	Sludge analysis	Crack set	Sea water ⁹⁾	GHS	Test
	■	■			■			■		Aluminum ²⁾
	■								■	Ammonium
	■					■	■		■	Cadmium ³⁾
	■	■							■	Chloride
	■	■	■					■		Chlorine
	■							■	■	Chlorine dioxide
	■	■			■	■		■	■	Chromate
	■	■			■		■	■	■	Cobalt
	■							■		Color (Hazen/DIN) ⁴⁾
	■	■	■		■	■	■	■		Copper
	■	■						■	■	Cyanide
	■								■	Detergents, anionic
	■								■	Detergents, cationic
	■	■						■	■	Fluoride
	■	■	■					■	■	Hydrazine
	■	■	■		■		■			Iron LR
	■	■	■		■		■	■	■	Iron
	■					■	■		■	Lead ³⁾
	■									Manganese LR
	■	■	■						■	Manganese
	■	■	■		■	■	■	■	■	Nickel
	■			■					■	Nitrate
	■	■							■	Nitrate Z
	■	■	■					■	■	Nitrite
	■							■	■	Ozone
	■	■						■	■	Phenol
	■	■	■					■	■	ortho-Phosphate
	■	■	■					■	■	ortho-Phosphate
	■									SAC ^{4) 7)}
	■	■	■					■	■	Silica
	■	■						■	■	Sulfide
	■							■		Turbidity (Formazine/DIN) ⁴⁾
	■	■			■	■	■	■	■	Zinc

NANOCOLOR[®] ECO

Flexible reagent kits for photometric analysis

NANOCOLOR[®] ECO reagent kits are convenient and flexible test sets for photometric analysis. They impress with their simple test procedure at low determination costs. A set includes all reagents needed for 100 determinations. The tests are performed and measured in 16 mm (REF 91680) or 24 mm (REF 936101) round test tubes without the need of additional beakers or volumetric flasks. The sensitivity can be increased by transferring the solution into a 50 mm semi micro cell (REF 91950). The reagent kits from the NANOCOLOR[®] ECO line are based on reaction chemistry of recognized standard methods and norms. All together, NANOCOLOR[®] ECO reagent kits combine convenient test procedures with secure and reliable measuring results.

Good to know

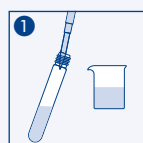
NANOCOLOR[®] ECO reagent kits include liquid or solid reagents which can be easily dosed with a pipette or tweezers.



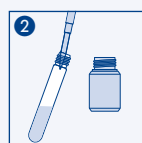
How it's done



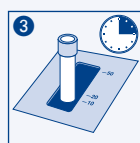
Procedure of NANOCOLOR[®] ECO tests



1 Add sample to cuvette



2 Add reagents and mix



3 Measure after reaction time

Ordering information

Test	REF	Measuring range	Shelf life	Number of tests	Method
■ Ammonium LR	976003	0.040–1.80 mg/L NH ₄ -N (16 mm) 0.020–1.15 mg/L NH ₄ -N (24 mm) 0.010–0.500 mg/L NH ₄ -N (50 mm)	1.5 years	100	Indophenol – according to APHA 4500-NH ₃ F, ISO 7150-1, DIN 38406-E5 and EPA 350.1

¹⁾ See instruction leaflet

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

Easy

- Pictograms as step-by-step instruction
- Tests are performed directly in 16 mm or 24 mm test tubes
- No complex sample preparation in volumetric flask or beaker

Reliable

- Reaction chemistry based on internationally accepted standard methods
- Constant quality from batch to batch
- Method validation data available for each reagent kit

Flexible

- Measurement in 16 mm or 24 mm round tubes
- Increased sensitivity by transfer into 50 mm semi micro cell
- Convenient test procedure with high sensitivity

Spectrophotometers
 PF-12^{Plus}
 Sea Water ¹⁾
 GHS
 Test

Ammonium LR



NANOCONTROL

Analytical quality control for a complete analytical system

With *NANOCONTROL* the user can check the complete *NANOCOLOR*[®] analytical system and his own work comprehensively and prove the correctness of his results. The performance of consequent analytical quality assurance allows for an objective proof of the accuracy of the photometric analysis resulting in acceptance by local authorities. MACHEREY-NAGEL offers a complete system to test and document the performance of the system for internal quality control. Together with our customers we developed a user-friendly system, future-proof, and tailor-made for the needs of the operator. Continuous development and innovation make us the market leader in all questions regarding quality control in photometric water analysis.

Single and multistandards

In *NANOCONTROL* standards the respective reference substances are dissolved with a defined concentration. This concentration of the standard solution is selected to be in the middle of the measuring range of the suitable test kit with a narrow confidence interval. The standard solution is applied in the test instead of a normal water sample. The test kit is then handled as described in the instructions. When the result of the test is within the confidence interval, the operator can be sure that all components of his analytical system are working correctly and that no handling error was made. In case of deviations from the given value, equipment and test kit have to be monitored and checked. In addition to solutions with only one standard substance also multistandards are available, containing a mixture of different standard substances. They are designed for special fields of application, e.g. waste water or drinking water analysis.

Hereby various characteristic parameters can be controlled with only one standard solution and the results can then be conveniently documented.

Good to know



All requirements on quality assurance (IQC) can be fulfilled with the *NANOCONTROL* System from MACHEREY-NAGEL.

Find an overview on page 16.



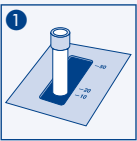
Spiking solutions

The concentration of a parameter in samples is increased by a defined value by spiking it with a standard addition using *NANOCONTROL* 100+ solutions. Possible interferences in the sample matrix can be detected under consideration of the recovery rates. This kind of plausibility test is especially recommended if an unknown sample has to be analyzed for the first time, or if it is known that the sample contains interfering substances as e.g. large amounts of salt or proteins. In addition to a dilution, this method can give insight to possible sources of error, if there is a continuous deviation from the expected measurement result. *NANOCONTROL* 100+ solutions are available for multi-standards as well as single standards.

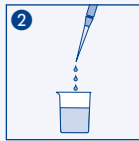
How it's done



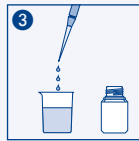
Procedure for *NANOCONTROL* 100+ addition



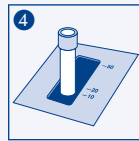
1 Determination of concentration of sample before spiking



2 Fill 10 mL of sample into beaker (or cuvette)



3 Add 100 µL 100+ addition solution and mix



4 Determination of new concentration

The difference in concentration should equal the theoretical value of the 100+ addition solution.



Ordering information

Standards

Standard	REF	Test number	Test	Number of tests	Concentration of standard ¹⁾	Confidence interval
Single standards						
■ AOX 3	92507	0-07	AOX 3	20	1.0 mg/L AOX	0.8–1.2 mg/L AOX
■ BOD ₅	92582	8-22 / 8-25	BOD ₅ / BOD ₅ -TT	10	210 mg/L O ₂	170–250 mg/L O ₂
■ Chlorine	92517	0-17 1-16	Chlorine / Ozone 2 Chlorine	30	0.80 mg/L Cl ₂ 1.00 mg/L Cl ₂	0.70–0.90 mg/L Cl ₂ 0.90–1.10 mg/L Cl ₂
■ Chromate	92524	0-24 0-59 1-25	Chromate 5 total Chromium 2 Chromate	15	2.0 mg/L CrO ₄ ²⁻ 0.90 mg/L Cr 0.40 mg/L CrO ₄ ²⁻	1.8–2.2 mg/L CrO ₄ ²⁻ 0.80–1.00 mg/L Cr 0.36–0.44 mg/L CrO ₄ ²⁻
■ COD 60	92522	0-27 / 0-22	COD 40 / COD 60	15	30 mg/L O ₂	26–34 mg/L O ₂
■ COD 160	92526	0-26 / 0-33 / 0-36	COD 160 / COD 300 / COD LR 150	15	100 mg/L O ₂	90–110 mg/L O ₂
■ COD 1500	92529	0-30 / 0-29 / 0-38	COD 600 / COD 1500 / COD HR 1500	15–30	400 mg/L O ₂	360–440 mg/L O ₂
■ COD 15000	92528	0-23 0-28	COD 10000 COD 15000	30–150	4.00 g/L O ₂ 4.0 g/L O ₂	3.60–4.40 g/L O ₂ 3.6–4.4 g/L O ₂
■ Nitrite	92568	0-68 0-69 1-67	Nitrite 2 Nitrite 4 Nitrite	15–150	0.30 mg/L NO ₂ -N 2.10 mg/L NO ₂ -N 0.060 mg/L NO ₂ -N	0.25–0.35 mg/L NO ₂ -N 1.9–2.3 mg/L NO ₂ -N 0.054–0.066 mg/L NO ₂ -N
■ ortho-Phosphate	92576	0-76 1-77	ortho- and total Phosphate 1 ortho-Phosphate	15	1.00 mg/L PO ₄ -P 0.2 mg/L PO ₄ -P	0.90–1.10 mg/L PO ₄ -P 0.18–0.22 mg/L PO ₄ -P
■ Sulfate	92562	0-62	Sulfate LR 200	15	120 mg/L SO ₄ ²⁻	110–130 mg/L SO ₄ ²⁻
■ Sulfite	92590	0-90	Sulfite 100	15	50 mg/L SO ₃ ²⁻	45–55 mg/L SO ₃ ²⁻
■ TOC 30	92575	0-75	TOC 30	15	10 mg/L C	8.5–11.5 mg/L C
■ TOC 300	92578	0-78	TOC 300	15	100 mg/L C	85–115 mg/L C
Multistandards						
■ Sewage outflow 1	925011	0-04 0-26 0-33 0-11 0-36 0-65 0-64 1-65 0-81 0-92	Ammonium 10 COD 160 COD 300 COD 4000 COD LR 150 Nitrate 8 Nitrate 50 Nitrate ortho- and total Phosphate 5 total Nitrogen TN _b 60	12–120	3.0 mg/L NH ₄ -N 114 mg/L O ₂ 114 mg/L O ₂ 2600 mg/L O ₂ 114 mg/L O ₂ 6.00 mg/L NO ₃ -N 6.0 mg/L NO ₃ -N 6.0 mg/L NO ₃ -N 6.0 mg/L NO ₃ -N 2.50 mg/L P 20 mg/L N	2.7–3.3 mg/L NH ₄ -N 103–125 mg/L O ₂ 103–125 mg/L O ₂ 2340–2860 mg/L O ₂ 103–125 mg/L O ₂ 5.20–6.80 mg/L NO ₃ -N 5.2–6.8 mg/L NO ₃ -N 5.2–6.8 mg/L NO ₃ -N 5.2–6.8 mg/L NO ₃ -N 2.25–2.75 mg/L P 18–22 mg/L N
■ Sewage outflow 2	925010	0-03 0-27 0-22 0-65 0-64 1-65 0-76 0-81 0-95 0-83 0-67	Ammonium 3 COD 40 COD 60 Nitrate 8 Nitrate 50 Nitrate total Phosphate 1 total Phosphate 5 total Phosphate LR total Nitrogen TN _b 22 TKN 16	12–120	1.50 mg/L NH ₄ -N 30 mg/L O ₂ 30 mg/L O ₂ 3.00 mg/L NO ₃ -N 3.0 mg/L NO ₃ -N 3.0 mg/L NO ₃ -N 3.0 mg/L NO ₃ -N 1.00 mg/L P 1.00 mg/L P 0.25 mg/L P 12.0 mg/L N 9.00 mg/L TKN	1.30–1.70 mg/L NH ₄ -N 26–34 mg/L O ₂ 26–34 mg/L O ₂ 2.60–3.40 mg/L NO ₃ -N 2.6–3.4 mg/L NO ₃ -N 2.6–3.4 mg/L NO ₃ -N 2.6–3.4 mg/L NO ₃ -N 0.90–1.10 mg/L P 0.90–1.10 mg/L P 0.22–0.28 mg/L P 10.0–14.0 mg/L N 6.6–11.4 TKN
■ Sewage inflow	925012	0-05 0-30 0-29 0-28 0-12 0-38 0-64 0-66 0-80 0-88	Ammonium 50 COD 600 COD 1500 COD 15000 COD 60000 COD HR 1500 Nitrate 50 Nitrate 250 total Phosphate 15 total Nitrogen TN _b 220	30–300	25.0 mg/L NH ₄ -N 400 mg/L O ₂ 400 mg/L O ₂ 10.0 g/L O ₂ 10.0 g/L O ₂ 400 mg/L O ₂ 15.0 mg/L NO ₃ -N 15 mg/L NO ₃ -N 8.00 mg/L P 75 mg/L N	22.0–28.0 mg/L NH ₄ -N 360–440 mg/L O ₂ 360–440 mg/L O ₂ 9.0–11.0 g/L O ₂ 9.0–11.0 g/L O ₂ 360–440 mg/L O ₂ 13.5–16.5 mg/L NO ₃ -N 13–17 mg/L NO ₃ -N 7.20–8.80 mg/L P 67–83 mg/L N

¹⁾ Please see the instruction leaflet / evaluation sheet.

²⁾ Shelf life 6 weeks after first opening / see instruction leaflet.

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

Addition	Shelf life ²⁾	GHS	Standard
Single standards			
1.0 mg/L AOX	1 year		AOX 3
–	1 year (2–8 °C)		BOD ₅
–	1 year	■	Chlorine
0.5 mg/L CrO ₄ ²⁻ 0.22 mg/L Cr 0.5 mg/L CrO ₄ ²⁻	1 year	■	Chromate
–	1 year (2–8 °C)		COD 60
–	1 year (2–8 °C)		COD 160
–	1 year (2–8 °C)		COD 1500
–	1 year (2–8 °C)		COD 15000
0.02 mg/L NO ₂ -N – 0.02 mg/L NO ₂ -N	1 year		Nitrite
0.10 mg/L PO ₄ -P 0.10 mg/L PO ₄ -P	1 year		ortho-Phosphate
–	1 year		Sulfate 200
–	1 year		Sulfite
–	1 year (2–8 °C)		TOC 30
–	1 year (2–8 °C)		TOC 300
Multistandards			
1.0 mg/L NH ₄ -N 25 mg/L O ₂ 25 mg/L O ₂ – – 1.50 mg/L NO ₃ -N 1.5 mg/L NO ₃ -N 1.5 mg/L NO ₃ -N 0.25 mg/L P 10 mg/L N	6 months		Sewage outflow 1
0.30 mg/L NH ₄ -N 10 mg/L O ₂ 10 mg/L O ₂ 3.00 mg/L NO ₃ -N 3.0 mg/L NO ₃ -N 3.0 mg/L NO ₃ -N 0.30 mg/L P 0.30 mg/L P 0.10 mg/L P 3.3 mg/L N 0.30 mg/L TKN	6 months (2–8 °C)		Sewage outflow 2
10 mg/L NH ₄ -N 100 mg/L O ₂ 100 mg/L O ₂ – – 100 mg/L O ₂ 6.0 mg/L NO ₃ -N 6 mg/L NO ₃ -N 1.00 mg/L P 20 mg/L N	1 year		Sewage inflow



Standard	REF	Test number	Test	Number of tests	Concentration of standard ¹⁾	Confidence interval
■ Metals 1	925015	0-14	Cadmium 2	15-60	1.00 mg/L Cd ²⁺	0.80-1.20 mg/L Cd ²⁺
		1-13	Cadmium		0.10 mg/L Cd ²⁺	0.08-0.12 mg/L Cd ²⁺
		0-21	Chloride 50		20 mg/L Cl ⁻	17-23 mg/L Cl ⁻
		0-19	Chloride 200		80 mg/L Cl ⁻	70-90 mg/L Cl ⁻
		0-24	Chromate 5 + NanOx Metal		1.0 mg/L Cr	0.8-1.2 mg/L Cr
		0-59	total Chromium 2		1.0 mg/L Cr	0.8-1.2 mg/L Cr
		1-25	Chromate + NanOx Metal		1.0 mg/L Cr	0.8-1.2 mg/L Cr
		0-37	Iron 3		1.00 mg/L Fe ³⁺	0.80-1.20 mg/L Fe ³⁺
		1-36	Iron		0.10 mg/L Fe ³⁺	0.08-0.12 mg/L Fe ³⁺
		1-28	Iron LR		0.10 mg/L Fe ³⁺	0.08-0.12 mg/L Fe ³⁺
		0-40	Fluoride 2		1.0 mg/L F ⁻	0.8-1.2 mg/L F ⁻
		1-42	Fluoride		1.00 mg/L F ⁻	0.80-1.20 mg/L F ⁻
		0-62	Sulfate LR 200		80 mg/L SO ₄ ²⁻	70-90 mg/L SO ₄ ²⁻
		0-60	Sulfate MR 400		80 mg/L SO ₄ ²⁻	70-90 mg/L SO ₄ ²⁻
		0-96	Zinc 4		1.00 mg/L Zn ²⁺	0.80-1.20 mg/L Zn ²⁺
		1-95	Zinc		0.10 mg/L Zn ²⁺	0.08-0.12 mg/L Zn ²⁺
		0-42	Zinc 6		1.00 mg/L Zn ²⁺	0.80-1.20 mg/L Zn ²⁺
■ Metals 2	925016	0-09	Lead 5	15	2.50 mg/L Pb ²⁺	2.25-2.75 mg/L Pb ²⁺
		1-10	Lead		0.25 mg/L Pb ²⁺	0.22-0.28 mg/L Pb ²⁺
		0-45	Potassium 50		20 mg/L K ⁺	18-22 mg/L K ⁺
		0-53 / 0-54	Copper 5 / Copper 7		2.00 mg/L Cu ²⁺	1.80-2.20 mg/L Cu ²⁺
		1-53	Copper		0.60 mg/L Cu ²⁺	0.50-0.70 mg/L Cu ²⁺
		0-61 / 0-71	Nickel 7 / Nickel 4		2.00 mg/L Ni ²⁺	1.80-2.20 mg/L Ni ²⁺
1-62	Nickel	0.60 mg/L Ni ²⁺	0.50-0.70 mg/L Ni ²⁺			
■ Seepage	925013	0-08	Ammonium 100	15-300	40 mg/L NH ₄ -N	36-44 mg/L NH ₄ -N
		0-06	Ammonium 200		80 mg/L NH ₄ -N	72-88 mg/L NH ₄ -N
		0-23	COD 10000		4.00 g/L O ₂	3.60-4.40 g/L O ₂
		0-28	COD 15000		4.0 g/L O ₂	3.6-4.4 g/L O ₂
		0-66	Nitrate 250		30 mg/L NO ₃ -N	27-33 mg/L NO ₃ -N
		0-55	total Phosphate 45		25.0 mg/L P	22.0-28.0 mg/L P
		0-79	ortho-Phosphate 50		25.0 mg/L PO ₄ -P	22.0-28.0 mg/L PO ₄ -P
■ Drinking water	925018	0-98	Aluminum 07	15-30	0.50 mg/L Al ³⁺	0.44-0.56 mg/L Al ³⁺
		1-02	Aluminium		0.50 mg/L Al ³⁺	0.44-0.56 mg/L Al ³⁺
		1-05	Ammonium		0.20 mg/L NH ₄ -N	0.17-0.23 mg/L NH ₄ -N
		0-21	Chloride 50		20 mg/L Cl ⁻	17-23 mg/L Cl ⁻
		1-20	Chloride		20 mg/L Cl ⁻	17-23 mg/L Cl ⁻
		0-37	Iron 3		1.50 mg/L Fe ³⁺	1.30-1.70 mg/L Fe ³⁺
		1-36	Iron		1.50 mg/L Fe ³⁺	1.30-1.70 mg/L Fe ³⁺
		0-58	Manganese 10		1.5 mg/L Mn ²⁺	1.3-1.7 mg/L Mn ²⁺
		1-60	Manganese		1.50 mg/L Mn ²⁺	1.30-1.70 mg/L Mn ²⁺
		0-86	Sulfate 200		120 mg/L SO ₄ ²⁻	102-138 mg/L SO ₄ ²⁻
		0-62	Sulfate LR 200		120 mg/L SO ₄ ²⁻	102-138 mg/L SO ₄ ²⁻

¹⁾ Please see the instruction leaflet / evaluation sheet.

²⁾ Shelf life 6 weeks after first opening / see instruction leaflet.

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

Addition	Shelf life ²⁾	GHS	Standard
– – 10 mg/L Cl ⁻ 50 mg/L Cl ⁻ 0.2 mg/L Cr 0.2 mg/L Cr 0.2 mg/L Cr 0.30 mg/L Fe ³⁺ 0.30 mg/L Fe ³⁺ 0.30 mg/L Fe ³⁺ 0.5 mg/L F ⁻ 0.50 mg/L F ⁻ 50 mg/L SO ₄ ²⁻ 50 mg/L SO ₄ ²⁻ 0.40 mg/L Zn ²⁺ 0.40 mg/L Zn ²⁺ 0.40 mg/L Zn ²⁺	1 year		Metals 1
0.50 mg/L Pb ²⁺ – 10 mg/L K ⁺ 0.70 mg/L Cu ²⁺ 0.70 mg/L Cu ²⁺ 0.70 mg/L Ni ²⁺ 0.70 mg/L Ni ²⁺	1 year		Metals 2
30 mg/L NH ₄ -N 30 mg/L NH ₄ -N – – 10 mg/L NO ₃ -N 5.0 mg/L P 5.0 mg/L PO ₄ -P	1 year		Seepage
0.20 mg/L Al ³⁺ 0.20 mg/L Al ³⁺ 0.20 mg/L NH ₄ -N 5.0 mg/L Cl ⁻ 5.0 mg/L Cl ⁻ 0.20 mg/L Fe ³⁺ 0.20 mg/L Fe ³⁺ 1.0 mg/L Mn ²⁺ 0.20 mg/L Mn ²⁺ 50 mg/L SO ₄ ²⁻ 50 mg/L SO ₄ ²⁻	1 year		Drinking water



NANOCOLOR® reagents for sample decomposition

Sample preparation for photometric analysis

Usually only dissolved compounds of a parameter are detected in water analysis. In strongly contaminated waters and industrial waste water these parameters are often bound in complexes or other structures and are therefore not directly accessible for the respective test. If it is necessary to determine the total amount of these substances, a decomposition step has to be done prior to analysis, where on most cases large amounts of organic material have to be decomposed. Within the NANOCOLOR® system there are various rapid and easy methods available for conventional sample decomposition with solid reagents and kits with liquid reagents for complex matrices. In some of the NANOCOLOR® tube tests the reagents for sample preparation are already included and pre-dosed in additional test tubes next to the cuvettes. This is the perfect combination for the determination of total parameters such as total nitrogen or total chromium. Other reagents for sample preparation are available separately and are suitable for more than one parameter. After digestion the samples are then processed as described in the instructions for the respective NANOCOLOR® test kit.

NANOCOLOR® NanOx N – Oxidative digestion of samples containing nitrogen

NANOCOLOR® NanOx N consists of an easy-to-dose solid oxidation reagent (peroxodisulfate) and a compensation reagent to eliminate interfering substances. After digestion, all inorganic and organic nitrogen compounds in the sample have been converted to nitrate and can be detected. The digestion of larger sample volumes allows a multiple determination from just one preparation.

NANOCOLOR® NanOx Metal – Oxidation of samples containing heavy metals

Undissolved metal ions and metal oxides are dissolved with the aid of acids and heat, metal ions are de-complexated and adsorptive or interfering substances are eliminated. Optimal recovery rates can be found in the analysis of heavy metals. NANOCOLOR® NanOx Metal consists of an easy-to-dose solid oxidation reagent (peroxodisulfate) and a neutralizing reagent to adjust the pH value for the following determination of different metals. In addition to the digestion in the heating block, it is possible to digest samples in less time using a microwave.

Good to know

For further accessories for digestions with NANOCOLOR® NanOx Metal in a heating block or a microwave see page 112.



NANOCOLOR[®] reagents for sample decomposition

NANOCOLOR[®] crack set

For a more powerful and complete digestion of resistant samples we recommend to use the NANOCOLOR[®] crack set. The included liquid reagents allow an oxidative sample preparation under acidic conditions (peroxodisulfate/sulfuric acid) and normal pressure at 100 °C in the heating block.

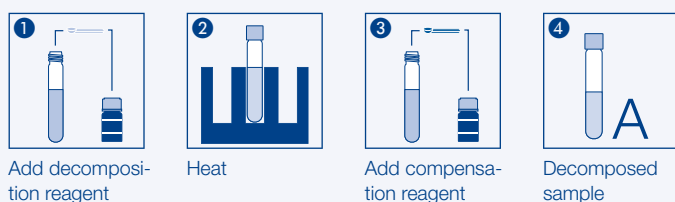
NANOCOLOR[®] sludge

In Germany, the sewage sludge regulation regularizes the use of sludge as fertilizer in agriculture and in market gardens. Therein a limit for seven heavy metals is established. The determination of these parameters is possible with high accuracy using NANOCOLOR[®] sludge (aqua regia) for digestion. A thorough training is recommended to learn the special working techniques before using the kit. Detailed instructions regarding sludge analysis can be provided free of charge.

How it's done



Decomposition in heating block with *NanOx N*



Ordering information

Description	REF	Number of decompositions	Shelf life	GHS
Determination of total Nitrogen				
■ NANOCOLOR [®] <i>NanOx N</i> solid reagents for the oxidative digestion prior to total nitrogen determination (heating block or microwave)	918979	50–100	1 year	■
Determination of total metals and phosphorous				
■ NANOCOLOR [®] <i>NanOx Metal</i> solid reagents for the oxidative decomposition of samples containing heavy metals and total phosphate (heating block or microwave)	918978	75–150	1 year	■
Crack set for aqueous systems				
■ Crack set incl. sulfuric acid /potassium peroxodisulfate for the oxidative digestion in the heating block	91808	100	3 years	■
■ Decomposition apparatus for sample decomposition incl. decomposition tube, reducing adaptor and condensor	91629	–	–	
Sludge analysis				
■ Reagent set NANOCOLOR [®] sludge: aqua regia digestion of sludge- and soil samples in the heating block	91850	10	3 years	■
■ Starter set combination of necessary accessories for sludge analysis (without reagents, photometer, heating block) incl. instructions	91610	–	–	

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® accessories

Everything from one hand

An indicator for the quality of an analytical system is its completeness. Therefore, accessories for sample drawing, preparation, and conservation as well as for decomposition, extraction and filtration are part of the NANOCOLOR® system.

Getting all these components from one hand allows a smooth work flow leading to optimal results.

Ordering information

Description	REF	Content	Number of tests	Shelf life	GHS
General accessories					
■ Volumetric flask 10 mL for reduced analytical preparations	91642	2 pieces			
■ Volumetric flask 25 mL with NS 10/19 and PE stopper for analytical preparations	91661	2 pieces			
■ Volumetric flask 100 mL with NS 12/21 and PE stopper	91683	2 pieces			
■ Erlenmeyer flask 50 mL	916212	1 piece			
■ Erlenmeyer flask 100 mL	91638	1 piece			
■ Measuring cylinder 50 mL	91684	1 piece			
■ Bulb for filling 20 mL pipettes	91665	1 piece			
■ Glass rod 30 cm	91639	1 piece			
■ Tweezers for picking of NANOFIX capsules	916114	1 piece			
■ Plastic wash bottle 500 mL with spraying attachment	91689	1 piece			
■ Magnetic stirring unit	970115	1 piece			
■ Mini-magnet for stirring (30 x 6 mm)	916211	1 piece			
■ Timer with digital display and acoustic signal (up to 99:59 min)	91696	1 piece			
■ Porcelain mortar 90 mm Ø with pestle	91688	1 piece			
■ Holder for 15 round glass tubes and 2 tubes for sample digestion	91623	1 piece			
■ Safety kit, consists of safety glasses, gloves and rubber apron	91690	1 piece			
■ Adhesive tape, glass fiber reinforced, for closing the shipping boxes for hazardous goods	91620	1 roll, 50 m			
■ Glass funnel 60 mm Ø	91681	1 piece			
■ Glass funnel 80 mm Ø	91682	1 piece			
■ Filter circles MN 1670, 11 cm Ø	470011	100 pieces			
■ Filter circles MN 640 d, 15 cm Ø	205015	100 pieces			
Membrane filtration					
■ Membrane filtration kit: 2 syringes 20 mL, 25 CHROMAFIL® membrane filters 0.45 µm	91650	1 set			
■ CHROMAFIL® membrane filters 0.45 µm	91652	50 pieces			
■ Membrane filtration kit: 2 syringes 20 mL, 25 CHROMAFIL® membrane filters 1.2 µm	916511	1 set			
■ CHROMAFIL® membrane filters 1.2 µm	916513	50 pieces			
■ Membrane filtration kit: 2 syringes 20 mL, 25 CHROMAFIL® membrane filters GF / PET 0.45 µm	91601	1 set			
■ CHROMAFIL® membrane filters GF / PET 0.45 µm	91602	50 pieces			
Pipetting					
■ Piston pipette 200 µL	91672	1 piece			
■ Plastic tips transparent for piston pipettes 5–200 µL	916915	100 pieces			
■ Piston pipette 500 µL	91653	1 piece			
■ Plastic tips transparent for piston pipettes 100–1000 µL	91676	100 pieces			
■ Piston pipette 1.0 mL	91671	1 piece			
■ Plastic tips transparent for piston pipettes 100–1000 µL	91676	100 pieces			

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

Description	REF	Content	Number of tests	Shelf life	GHS
■ Piston pipette 2.0 mL	916917	1 piece			
■ Plastic tips transparent for piston pipettes 1.0–5.0 mL	916916	100 pieces			
■ Digital piston pipette 5–50 µL, adjustable, with tip ejector	91658	1 piece			
■ Digital piston pipette 50–200 µL, adjustable, with tip ejector	916914	1 piece			
■ Plastic tips transparent for piston pipettes 5–50 µL and 50–200 µL	916915	100 pieces			
■ Digital piston pipette 100–1000 µL, adjustable, with tip ejector	91677	1 piece			
■ Plastic tips transparent for piston pipettes 100–1000 µL	91676	100 pieces			
■ Digital piston pipette 1.0–5.0 mL, adjustable, with tip ejector	916909	1 piece			
■ Plastic tips transparent for piston pipettes 1.0–5.0 mL	916916	100 pieces			
■ Pipette stand for 6 piston pipettes	91679	1 piece			
Extraction					
■ 100 mL separation funnel with NS glass tap and PE stopper for extraction methods	91664	2 pieces			
■ Stand with clamps and bosses for 4 separation funnels, height 70 cm	91695	1 piece			
AOX					
■ Supplement kit for AOX for the sensitive AOX range (0.01–0.30 mg/L AOX) and for higher COD values (required above 50 mg/L COD)	918072	2 x 4 g	20	1 year	■
■ Chloride detection kit AOX for samples with high chloride contents	918073	10 mL		1 year	■
■ Starter set for AOX, consists of tweezers, funnel, cartridge adaptor, beaker, glass rods, 1 L bottle and syringes	916111	1 set			
■ Pump set for AOX, consists of centrifugal pump, connecting tubes, graduated 1 L reservoir with tap and stand with clamps and bosses	916115	1 set			
■ NANOCOLOR® cartridge adapter for AOX pump-set	916113	1 piece			
BOD₅					
■ BOD ₅ nutrient mixture (without <i>N</i> -allylthiourea [NATU])	918994	20 cuvettes	20–80	2 years	
■ BOD ₅ nutrient mixture PLUS (with <i>N</i> -allylthiourea [NATU])	918995	20 cuvettes	20–80	2 years	
■ BOD ₅ accessories set, consists of electric air pump, 10 L PE container, 2 aerating bricks, 1 L laboratory bottle, 4 Winkler bottles	916918	1 set			
■ BOD ₅ -TT accessories set, consists of electric air pump, 2 aerating bricks, 1 L PE container, 2 reaction vessels (40 mL)	916925	1 set			
■ Reaction vessels for BOD ₅ -TT	916926	10 pieces			
■ Oxygen bottles according to Winkler (250–300 mL)	916919	4 pieces			
■ Aerating bricks for BOD ₅ determination	916920	4 pieces			
COD					
■ Chloride complexing agent for chloride concentration of 1000–7000 mg/L Cl ⁻	918911	100 mL	100	1.5 years	■
■ Cartridges for chloride elimination of up to 2000 mg/L chloride per cartridge	963911	10 pieces	10	1 year (2–8 °C)	■
■ COD- and TOC-free water	918993	50 mL		1 year	
■ Safety bottle for shaking COD tubes	91637	1 piece			
Hydrocarbons					
■ Extraction of HC from water	918571	1 box	20	1.5 years	■
■ Extraction of HC from soil	918572	1 box	20	1.5 years	■
■ Separation funnel 500 mL with PTFE tap and glass stopper	91608	2 pieces			
■ CHROMABOND® column 45 mL with 4 g aluminum oxide ALOX N for purification of water and soil extracts by solid phase extraction	730250	20 pieces	20	3 years	
■ Syringe adaptor for CHROMABOND® columns 45 mL	91603	2 pieces			
■ Plastic syringes 50 mL	91609	10 pieces			

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.

NANOCOLOR® accessories

Description	REF	Content	Number of tests	Shelf life	GHS
■ Stop valve for pipette tips for low-viscosity liquids	91621	100 pieces			
■ Threaded union for coupling the sample tube with the COD tube	91604	2 pieces			
■ Soxhlet apparatus 30 mL, with 100 mL round flask with flat bottom and condenser (3 parts); additionally a heater is required	91605	1 set			
■ Extraction thimbles MN 64523 mm Ø x 100 mm	645008	25 pieces			
■ Measuring flask 50 mL with PE stopper	91606	2 pieces			
TOC					
■ NANOCOLOR® TIC-Ex for removal of TIC, incl. cuvette holder, power supply 100–240 V, 50/60 Hz, 9 V + 3 adapters, manual	916993	1 piece			
■ Manual for NANOCOLOR® TIC-Ex	916994	1 piece			
■ Cuvette holder for NANOCOLOR® TIC-Ex	916995	1 piece			
■ Power supply for QUANTOFIX® Relax and NANOCOLOR® TIC-Ex	930995	1 piece			
■ Pipette tips for NANOCOLOR® TIC-Ex	916997	20 pieces			
■ Pipette tips for NANOCOLOR® TIC-Ex	916998	200 pieces			
■ Cover for NANOCOLOR® VIS for TOC determination	916996	1 piece			
■ Holder for 15 round glass tubes and 2 tubes	91623	1 piece			
Special chemicals for elimination of interferences					
■ Distilled water	918932	1 L		1 year	
■ Silica-free water	918912	1 L		1 year	
■ Isobutyl methyl ketone (MIBK) for phenol test 0-74	918929	100 mL			■
Reagents for sample preparation					
■ Carrez solutions 1 + 2, for nitrite in cooling lubricants, sewage water from landfills etc.	918937	2 x 30 mL	30	2 years	
■ Removal of interfering calcium for determinations of copper, nickel and zinc by lime precipitation clarification	918939	100 g	20	2.5 years	
■ Amidosulfuric acid for nitrite elimination	918973	25 g		2 years	■
■ Ammonium compensation reagent for tube test NANOCOLOR® Potassium 50	918045	30 mL	100	2 years	■

GHS: Globally harmonized system: This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see the SDS.