Water Analysis

MACHEREY-NAGEL

NANOCOLOR®
analysis system



NANOCOLOR® analysis system

- Expertise
- Continuity
- Passion

Distributed By:

The Laboratory People camlab

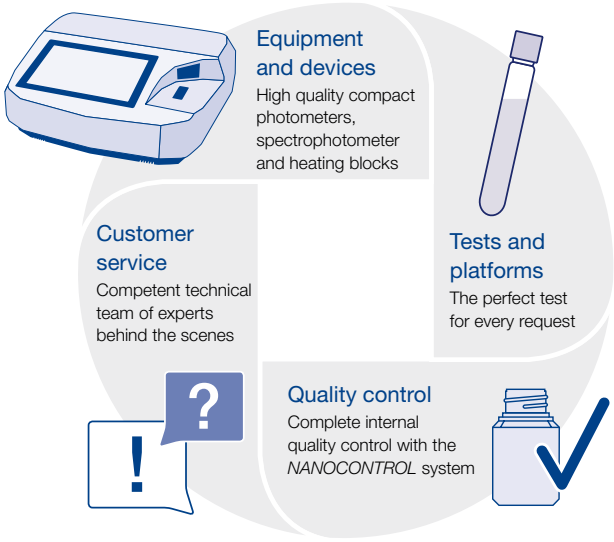
MN Since 1911

NANOCOLOR® analysis system

40 years of expertise, continuity and passion for our customers

For over 40 years, MACHEREY-NAGEL has been developing solutions in the field of photometry. Continuous equipment and software development, extraordinary close customer relations and passion for our work allow us to offer you the *NANOCOLOR*® system with high reliability and quality.

- ISO-certified production in Germany ensuring highest quality “Made in Germany“
- Consistent quality from batch to batch – no LOT-specific updates required
- SDS, user manuals and LOT-specific certificates
- Intensive Research and Development in the field of Water Analysis to meet future demands and requirements
- One-on-one service by our trained distributors on site and our Customer Service Center in Düren, Germany





NANOCOLOR® analysis system

Test tubes in convenient packaging for safe and easy handling

NANOCOLOR® reagents impress by easy handling and are suited for routine analysis, self-monitoring and process control. 16 mm round tubes with pre-dosed reagents guarantee a maximum safety for the user.

- Rugged boxes with perfect light protection
- Color-coded labels with all important information
- Colored pictograms on package lid for perfect test execution
- Convenient and safe removal of test tubes
- Describable top-label enabling an explicit allocation of test tubes
- Wide test tube openings for easy handling and safe pipetting



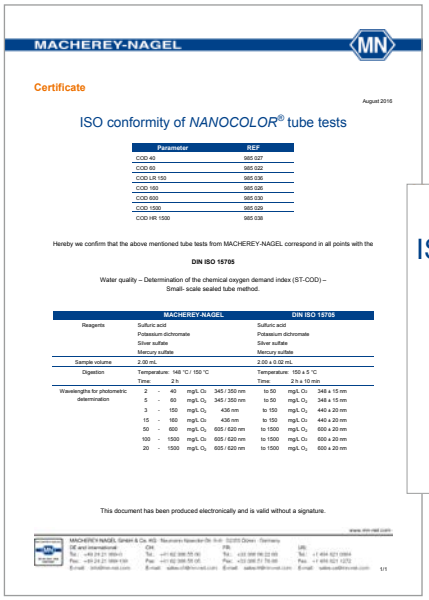


NANOCOLOR® analysis system

The perfect COD test for each and every user

For one of the most important parameters for determination of industrial and municipal waste water MACHEREY-NAGEL offers you even 12 different tests and measurement ranges. At the same time our COD tests allow safe handling without any risk from escaping dichromate and mercury gases. Even after the REACH restrictions in 2017, our customers can continue using our *NANOCOLOR*® COD cuvette tests without limitation.

- 12 measurement ranges for all requirements and demands
- Reaction base according to ISO 6060
- 7 COD tests compliant with ISO 15705
- No zero measurement required
- Audited and certified: no mercury exposure for users
- Mercury-free COD tests available for inflow and outflow measurements



MACHEREY-NAGEL

Certificate

August 2016

ISO conformity of *NANOCOLOR*® tube tests

Parameter	REF
COD 40	985 027
COD 60	985 022
COD LR 150	985 036
COD 160	985 026
COD 600	985 030
COD 1500	985 029
COD HR 1500	985 038

Hereby we confirm that the above mentioned tube tests from MACHEREY-NAGEL correspond in all points with the

DIN ISO 15705

Water quality – Determination of the chemical oxygen demand index (ST-COD) – Small- scale sealed tube method.

	MACHEREY-NAGEL				DIN ISO 15705			
Reagents	Sulfuric acid Potassium dichromate Silver sulfate Mercury sulfate				Sulfuric acid Potassium dichromate Silver sulfate Mercury sulfate			
Sample volume	2.00 mL				2.00 ± 0.02 mL			
Digestion	Temperature: 148 °C / 150 °C Time: 2 h				Temperature: 150 ± 5 °C Time: 2 h ± 10 min			
Wavelengths for photometric determination	2	-	40	mg/L Cr_2 345 / 350 nm	to 50	mg/L O_2	348 ± 15 nm	
	5	-	60	mg/L O_2 345 / 350 nm	to 50	mg/L O_2	348 ± 15 nm	
	3	-	150	mg/L O_2 436 nm	to 150	mg/L O_2	440 ± 20 nm	
	15	-	160	mg/L Cr_2 436 nm	to 150	mg/L O_2	440 ± 20 nm	
	50	-	600	mg/L O_2 605 / 620 nm	to 1500	mg/L O_2	600 ± 20 nm	
	100	-	1500	mg/L Cr_2 605 / 620 nm	to 1500	mg/L O_2	600 ± 20 nm	
	20	-	1500	mg/L O_2 605 / 620 nm	to 1500	mg/L O_2	600 ± 20 nm	

This document has been produced electronically and is valid without a signature.

MACHEREY-NAGEL GmbH & Co. KG · Neumann-Neander-Str. 6–8 · 52355 Düren · Germany

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ISO conformity of *NANOCOLOR*® tube tests

Parameter	REF
COD 40	985 027
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COD 600	985 030
COD 1500	985 029
COD HR 1500	985 038



NANOCOLOR® analysis system

Time-saving and reliable analysis of total nitrogen

The proven *NANOCOLOR*® total nitrogen tests are perfectly suited for the reliable determination of total nitrogen in waste water. Beside reproducible results they offer you a very simple and fast handling.

- One single test tube for each digestion
- Less testing steps through prefilled digestion reagents
- No contamination since digestion tubes are never used twice
- No cleaning of digestion tubes required
- Safe results through sufficiently large sample volumes





NANOCOLOR® analysis system

Smart photometry

Spectrophotometers *NANOCOLOR*® $^{UV}/_{VIS}$ II and *VIS* II

MACHEREY-NAGEL is revolutionizing your daily laboratory work with the spectrophotometers *NANOCOLOR*® $^{UV}/_{VIS}$ II and *NANOCOLOR*® *VIS* II and combines a superior quality, high-tech electronic device with an outstanding usability. Operate this innovative photometers like your smartphone or tablet and enjoy the intuitive, icon-based operation every day in a new way. Due to the clearly arranged and high-resolution touch screen display, the daily measurement routine will become a pleasure.

- Revolutionary user experience by 10 inch HD touch screen display
- Intuitive and completely icon-based menu guidance
- Integrated turbidity control (NTU-Check) and CIE-conform color measurements
- Completely inbuilt equipment monitoring functions and printing of certificates
- Integrated lamp test and stray light according to Ph.Eur.
- Wavelength-correctness test with integrated Holmium oxide filter





Automatic turbidity check for tube tests

Despite careful working procedures and constant quality control, turbidity is often underestimated as a source of error in photometric water analysis which can lead to significant deviations in measuring values up to 30 %. To increase result safety for users, MACHEREY-NAGEL has integrated a unique turbidity control function (NTU-Check) for tube tests into our spectrophotometers.

- Innovative and unique solution for turbidity problems, warns in case of potential interferences
- Elimination of a frequently underestimated source of errors in the field of photometry
- Turbidity displayed directly in NTU according to EN ISO 7027
- Maximum measurement accuracy
- Outstanding results in COD analysis
- Complete documentation through parallel storage of measurements and NTU values
- Convenient turbidity calibration with *NANOCONTROL* NANOTURB





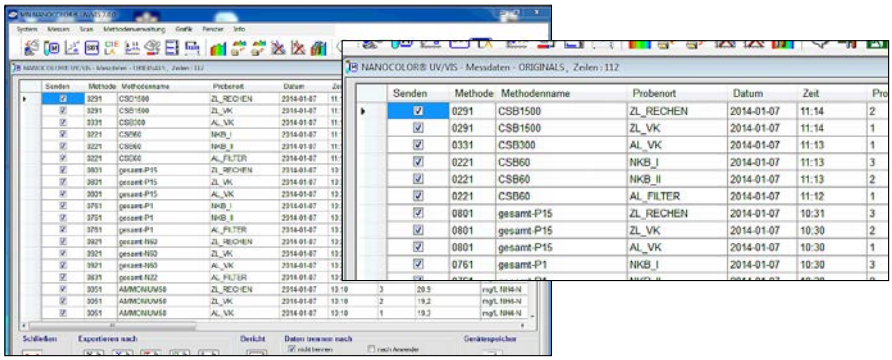
2 tubes (A/B) with the same COD concentration

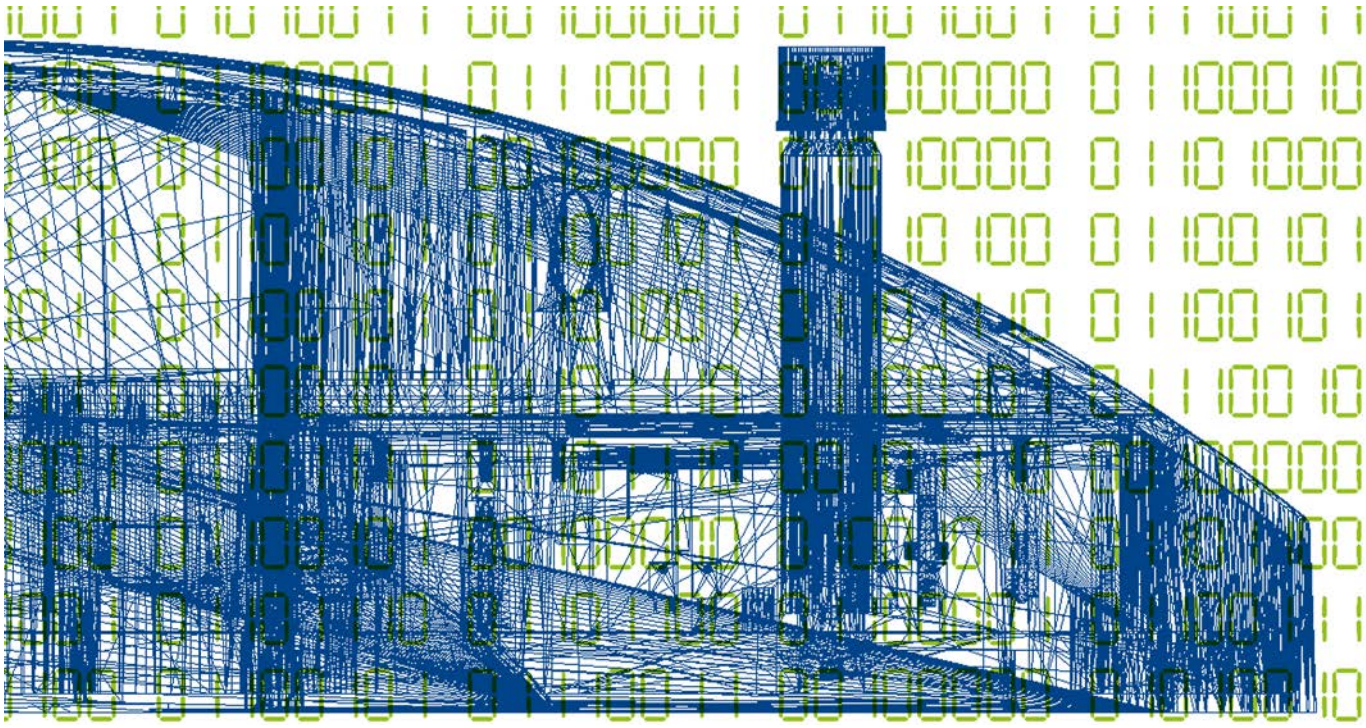


Convenient data export to LIMS and other standard PC-programs

In modern laboratories dealing with water and waste water analysis, the combination of the different data sets and test results is getting more and more important. Using the free of charge *NANOCOLOR*® PC software, the data from *NANOCOLOR*® spectrophotometers can be elegantly integrated into various laboratory information systems. This is going to be easier and even more efficient employing novel photometer updates.

- Free of charge PC software with numerous additional features
- Easy data transfer to Microsoft® Excel
- Automated compilation of original files for tamper-proof data storage in accordance with FDA 21 CFR Part 11
- Connection to laboratory information systems (LIS) using tailor-made data configuration tools
- Efficient documentation of measurement results
- Fast and easy data management according to GLP

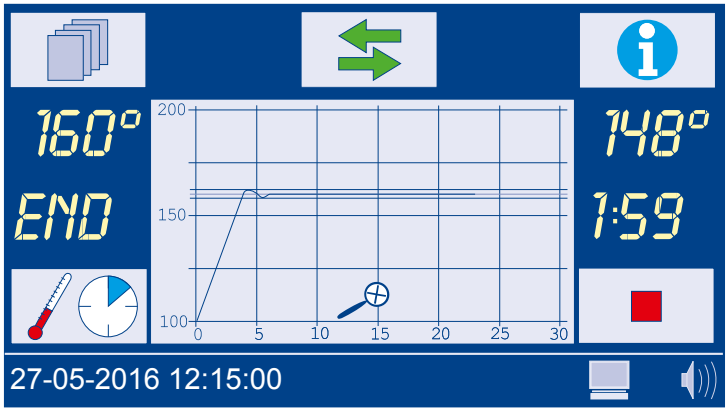




Future-proof heating blocks for reliable sample digestion

The *NANOCOLOR*® heating blocks enable a fast and safe performance of all required digestions. The preprogrammed standard parameter for all routine digestions, e.g., for COD, TOC, total nitrogen, total phosphate and metals help avoid errors.

- 2 separate heating units for parallel rapid digestion of COD, total nitrogen and total phosphate
- Touch screen with intuitive menu navigation for easy handling
- Lockable protective lids and safety covers for maximum protection
- USB interface for future-proof PC connection
- Graphical monitoring of heating curves
- Extremely short heating times translate into time savings for the user
- High temperature stability for consistent digestion conditions

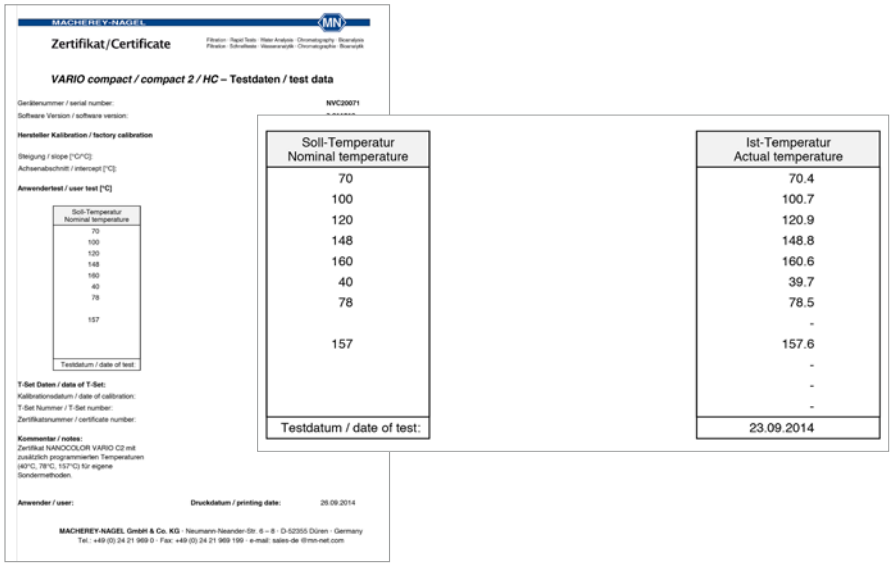




NANOCOLOR® USB T-Set and T-Set
Automatic heating block control and calibration

The unique *NANOCOLOR*® T-Set is an electronic temperature sensor for temperature control and fully automatic calibration of the heating blocks. The user can check the heating blocks independently with the *NANOCOLOR*® T-Set for internal quality control purposes.

- Calibrated temperature sensors made to monitor digestion temperatures
- Easy monitoring of temperature stability through external recordings of heating curves
- *NANOCOLOR*® T-Set also suitable as a universal thermometer for external temperature measurements
- Convenient data transfer via USB interface
- GLP conform documentation with automatically generated inspection reports



MACHEREY-NAGEL

Zertifikat/Certificate

VARIO compact / compact 2 / HC – Testdaten / test data

Geräteнummer / serial number: NVC20071

Software Version / software version:

Hersteller Kalibration / factory calibration

Steigung / slope [°C/°C]:

Achsenabschnitt / intercept [°C]:

Anwendertest / user test [°C]

Soll-Temperatur Nominal temperature	Ist-Temperatur Actual temperature
70	70.4
100	100.7
120	120.9
148	148.8
160	160.6
40	39.7
78	78.5
	-
157	157.6
	-
	-
	-
Testdatum / date of test:	23.09.2014

T-Set Daten / data of T-Set:

Kalibrationsdatum / date of calibration:

T-Set Nummer / T-Set number:

Zertifikatsnummer / certificate number:

Kommentar / notes:

Zertifikat NANOCOLOR VARIO C2 mit zusätzlich programmierten Temperaturen (40°C, 78°C, 157°C) für eigene Sondermethoden.

Anwender / user: **Druckdatum / printing date:** 26.09.2014

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NANOCOLOR® analysis system

Quality control for photometric water analysis

With the *NANOCONTROL* system MACHEREY-NAGEL offers you a complete range of products for analytical quality control for all analyses carried out with our *NANOCOLOR*® system. It gives you options to check all *NANOCOLOR*® reagents and test kits, photometers, heating blocks and your personal handling and work flow, thus providing 360 degree feedback on your analytical work.

- Measurement of single and multi standards with *NANOCONTROL*
- Plausibility checks with *NANOCONTROL* addition solutions
- Heating block inspection with the *NANOCOLOR*® T-Set
- Photometer inspection with the *NANOCONTROL* NANOCHECK
- Convenient turbidity calibration with *NANOCONTROL* NANOTURB





NANOCOLOR® analysis system

NANOCOLOR® photometers – At a glance

NANOCOLOR® *UV/VIS* II



- High precision spectrophotometer with outstanding usability
- Nephelometric stray light measurement from 0.1–1000 NTU
- Integrated f.o.c. inspection equipment monitoring

REF 919600

NANOCOLOR® *VIS* II



- Revolutionary user experience by 10 inch HD touch screen display
- Integrated turbidity measurement (NTU-Check)
- Internal quality control functions

REF 919650

NANOCOLOR® 500 D



- Fastest digital photmeter on the market
- Shock proof according to German military standard
- Inbuilt battery

REF 919500

Compact photometer PF-12*Plus*



- Flexible filter photometer with more than 100 preprogrammed methods
- Nephelometric turbidity measurements
- Integrated turbidity control (NTU-Check)

REF 919250

Compact photometer PF-3



- Lightweight and robust by very compact dimensions
- Intuitive operation using just 4 buttons
- Different versions for different applications available

PF-3 Pool	REF 934102
PF-3 Drinking Water	REF 934402
PF-3 Soil	REF 934202
PF-3 COD	REF 934302
PF-3 Fish	REF 934602



NANOCOLOR® analysis system

NANOCOLOR® heating blocks – At a glance

NANOCOLOR® VARIO 4



- Simultaneous digestion of 24 samples
- Two independently usable heating units
- The most flexible solution

REF 919300

NANOCOLOR® VARIO C2



- Simultaneous digestion of 12 samples
- The ideal choice for small sample amounts
- Cost-effective quality

REF 919350

NANOCOLOR® VARIO C2 M



- Simultaneous digestion of 10 samples
- Heating block for metall analysis with big bores
- Digestion of big and small reaction glasses

REF 919350.1

NANOCOLOR® VARIO HC



- Simultaneous digestion of 12 samples
- Active rapid cooling after digestion
- Heating unit with aerator

REF 919330

NANOCOLOR® VARIO Mini



- Simultaneous digestion of 6 samples
- The ideal choice for mobile digestions
- Flexible power supply

REF 919380



NANOCOLOR® tube tests - At a glance



Test	Measuring range		REF
Aluminum 07	0.02–0.70 mg/L Al^{3+}		985098
Ammonium 3	0.04–2.30 mg/L NH_4-N	0.05–3.00 mg/L NH_4^+	985003
Ammonium 10	0.2–8.0 mg/L NH_4-N	0.2–10.0 mg/L NH_4^+	985004
Ammonium 50	1–40 mg/L NH_4-N	1–50 mg/L NH_4^+	985005
Ammonium 100	4–80 mg/L NH_4-N	5–100 mg/L NH_4^+	985008
Ammonium 200	30–160 mg/L NH_4-N	40–200 mg/L NH_4^+	985006
Ammonium 2000	300–1600 mg/L NH_4-N 400–2000 mg/L NH_4^+	400–2000 mg/L NH_4^+	985002
AOX 3	0.1–3.0 mg/L AOX	0.01–0.30 mg/L AOX	985007
BOD_5 (in Winkler bottles)	2–3000 mg/L O_2		985822
BOD_5-TT	0.5–3000 mg/L O_2		985825
Cadmium 2	0.05–2.00 mg/L Cd^{2+}		985014
Carbonate hardness 15	1.25-18.75 °e	0.4–5.4 mmol/L H^+	985015
Chloride 200	5–200 mg/L Cl^-		985019
Chloride 50	0.5–50.0 mg/L Cl^-	0.10–1.00 g/L Cl^-	985021
Chlorine / Ozone 2	0.05–2.50 mg/L Cl_2	0.05–2.00 mg/L O_3	985017
Chlorine dioxid 5	0.15–5.00 mg/L ClO_2		985018
Chromate 5	0.05–2.00 mg/L Cr(VI) 0.005–0.500 mg/L Cr(VI)	0.1–4.0 mg/L CrO_4^{2-} 0.01–1.00 mg/L CrO_4^{2-}	985024
Total Chromium 2	0.05–2.00 mg/L Cr 0.005–0.500 mg/L Cr(VI)		985059
COD 40	2–40 mg/L O_2		985027
COD 60	5–60 mg/L O_2		985022
COD 160	15–160 mg/L O_2		985026
COD 160 Hg-free	15–160 mg/L O_2		963026
COD 300	50–300 mg/L O_2		985033
COD 600	50–600 mg/L O_2		985030
COD 1500	100–1500 mg/L O_2		985029
COD 1500 Hg-free	100-1500 mg/L O_2		963029
COD 4000	400–4000 mg/L O_2		985011
COD 10000	1.00–10.00 g/L O_2		985023
COD 15000	1.0–15.0 g/L O_2		985028
COD 60000	5.0–60.0 g/L O_2		985012
COD LR 150	3–150 mg/L O_2		985036
COD HR 1500	20–1500 mg/L O_2		985038
org. Complexing agents 10	0.5–10.0 mg/L I_{BiK}		985052
Copper 5	0.10–7.00 mg/L Cu^{2+}		985053
Cyanide 08	0.02–0.80 mg/L CN^- 0.005-0.100 mg/L CN^-		985031
DEHA 1 (Diethylhydroxylamine)	0.05–1.00 mg/L DEHA		985035
Ethanol 1000	0.10–1.00 g/L EtOH	0.013–0.130 Vol. % EtOH	985838
Fluoride 2	0.1–2.0 mg/L F^-		985040
Formaldehyde 8	0.1–8.0 mg/L HCHO		985041
Formaldehyde 10	0.20–10.00 mg/L HCHO		985046
Hardness Ca / Mg	1.25–25.0 °e 0.2–3.6 mmol/L	5–50 mg/L Mg^{2+} 10–100 mg/L Ca^{2+}	985044
Hardness 20	1.25–25.0 °e 0.2–3.6 mmol/L	5–50 mg/L Mg^{2+} 10–100 mg/L Ca^{2+}	985043
HC 300 (Hydrocarbons)	0.5–5.6 mg/L KW	30–300 mg/kg KW	985057
Iron 3	0.10–3.00 mg/L Fe		985037
Lead 5	0.10–5.00 mg/L Pb^{2+}		985009

NANOCOLOR® analysis system

Test	Measuring range		REF
Manganese 10	0.1–10.0 mg/L Mn		985058
Methanol 15	0.2–15.0 mg/L MeOH		985859
Molybdenum 40	1.0–40.0 mg/L Mo(VI)	1.6–65.0 mg/L MoO_4^{2-}	985056
Nickel 4	0.10–7.00 mg/L Ni^{2+}		985071
Nitrate 8	0.30–8.00 mg/L NO_3-N	1.3–35.0 mg/L NO_3^-	985065
Nitrate 50	0.3–22.0 mg/L NO_3-N	2–100 mg/L NO_3^-	985064
Nitrate 250	4–60 mg/L NO_3-N	20–250 mg/L NO_3^-	985066
Nitrite 2	0.003–0.460 mg/L NO_2-N	0.02–1.50 mg/L NO_2^-	985068
Nitrite 4	0.1–4.0 mg/L NO_2-N	0.3–13.0 mg/L NO_2^-	985069
total Nitrogen TN_b 22	0.5–22.0 mg/L N		985083
total Nitrogen TN_b 60	3–60 mg/L N		985092
total Nitrogen TN_b 220	5–220 mg/L N		985088
total Kjeldahl Nitrogen TKN 16	1.0–16 mg/L TKN		985067
Organic acids 3000	30–3000 mg/L CH_3COOH	0.5–50.0 mmol/L CH_3COOH	985050
Oxygen 12	0.5–12.0 mg/L O_2		985082
Peroxide 2	0.03–2.00 mg/L H_2O_2		985871
pH 6.5–8.2	pH 6.5–8.2		91872
Phenolic Index 5	0.2–5.0 mg/L Phenol		985074
ortho- and total Phosphate 1	0.05–1.50 mg/L P 0.010–0.800 mg/L P	0.2–5.0 mg/L PO_4^{3-} 0.03–2.50 mg/L PO_4^{3-}	985076
ortho- and total Phosphate 5	0.20–5.00 mg/L P	0.5–15.0 mg/L PO_4^{3-}	985081
ortho- and total Phosphate 15	0.30–15.00 mg/L P	1.0–45.0 mg/L PO_4^{3-}	985080
ortho- and total Phosphate 45	5.0–50.0 mg/L P	15–150 mg/L PO_4^{3-}	985055
ortho- and total Phosphate 50	10.0–50.0 mg/L P	30–150 mg/L PO_4^{3-}	985079
ortho- and total Phosphate LR 1	0.05–0.50 mg/L P	0.2–1.5 mg/L PO_4^{3-}	985095
POC 200	20–200 mg/L POC	2–40 mg/L KWI	985070
Potassium 50	2–50 mg/L K^+		985045
Residual hardness 1	0.03–1.25 °e	0.004–0.180 mmol/L	985084
Silver 3	0.20–3.00 mg/L Ag^+	0.08–0.50 mg/L Ag^+	985049
Starch 100	5–100 mg/L starch		985085
Sulfate 200	10–200 mg/L SO_4^{2-}		985086
Sulfate 1000	200–1000 mg/L SO_4^{2-}		985087
Sulfate LR 200	20-200 mg/L SO_4^{2-}		985062
Sulfide 3	0.05–3.00 mg/L S^{2-}		985073
Sulfite 10	0.2–10.0 mg/L SO_3^{2-}	0.05–2.40 mg/L SO_3^{2-}	985089
Sulfite 100	5–100 mg/L SO_3^{2-}		985090
Anionic Surfactants 4	0.20–4.00 mg/L MBAS	0.20–3.500 mg/L SDS	985032
Cationic Surfactants 4	0.20–4.00 mg/L CTAB		985034
Nonionic Surfactants 15	0.3–15.0 mg/L Triton® X-100		985047
Thiocyanate 50	0.5–50.0 mg/L SCN^-		985091
Tin 3	0.10–3.00 mg/L Sn		985 097
TOC 30	2.0–30.0 mg/L C		985075
TOC 300	20–300 mg/L C		985078
TOC 25	2.0–25.0 mg/L C		985093
TOC 60	10–60 mg/L C		985094
TOC 600	40–600 mg/L C		985099
TTC / Sludge activity 150	5–150 µg TPF	0.050–2.300 E	985890
Zinc 4	0.10–4.00 mg/L Zn^{2+}		985096
Zinc 6	0.20–6.00 mg/L Zn^{2+}		985042
Zirconium 100	5–100 mg/L Zr		985001

NANOCOLOR® Analysensystem



NANOCOLOR® standard tests – At a glance

Test	Measuring range		REF
Aluminum	0.01–1.00 mg/L Al^{3+}		91802
Ammonium	0.01–2.0 mg/L NH_4-N	0.01–2.5 mg/L NH_4^+	91805
Cadmium	0.002–0.50 mg/L Cd^{2+}		918131
Chloride	0.2–125 mg/L Cl^-		91820
Chlorine	0.02–10.0 mg/L Cl_2		91816
Chlorine dioxid	0.04–4.00 mg/L ClO_2		918163
Chromate	0.01–3.0 mg/L Cr(VI)	0.01–6.0 mg/L CrO_4^{2-}	91825
Cobalt	0.002–0.70 mg/L Co^{2+}		91851
Color (Hazen/DIN)	5–500 mg/L Pt (Hazen)	0.2–20.0 ^{1}/m	Test 1-39
Copper	0.01–10.0 mg/L Cu^{2+}		91853
Cyanide	0.001–0.50 mg/L CN^-		91830
Detergents, anionic	0.02–5.0 mg/L MBAS		91832
Detergents, cationic	0.05–5.0 mg/L CTAB		91834
Fluoride	0.05–2.00 mg/L F^-		918142
Hydrazine	0.002–1.50 mg/L N_2H_4		91844
Iron	0.01–15.0 mg/L Fe		91836
Lead	0.005–1.00 mg/L Pb^{2+}		918101
Manganese	0.01–10.0 mg/L Mn		91860
Nickel	0.01–10.0 mg/L Ni^{2+}		91862
Nitrate	0.1–30.0 mg/L NO_3-N	0.5–140 mg/L NO_3^-	91865
Nitrate Z	0.02–1.0 mg/L NO_3-N	0.1–5.0 mg/L NO_3^-	91863
Nitrite	0.002–0.30 mg/L NO_2-N	0.005–1.00 mg/L NO_2^-	91867
Ozone	0.01–1.50 mg/L O_3		91885
Phenol	0.01–7.0 mg/L Phenol		91875
ortho-Phosphate	0.04–6.5 mg/L PO_4-P	0.1–20.0 mg/L PO_4^{3-}	91877
ortho-Phosphate	0.2–17 mg/L PO_4-P	0.5–50 mg/L PO_4^{3-}	91878
SAC	0.1–150.0 ^{1}/m		Test 3-01
Silica	0.01–10.00 mg/L Si 0.002–0.100 mg/L Si	0.02–10.0 mg/L SiO_2 0.005–0.200 mg/L SiO_2	91848
Sulfide	0.01–3.0 mg/L S^{2-}		91888
Turbidity (Formazine/DIN)	1–100 TE/F (= FAU)	0.5–40.0 ^{1}/m	Test 1-92
Turbidity	1–1000 NTU		Test 9-06
Zinc	0.02–3.0 mg/L Zn^{2+}		91895

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