

Rapid Tests

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Test papers and test strips



Colorimetric and titrimetric test kits



Photometric water analysis and IQC



Water Analysis

We are pleased to advise you!

If you have any questions concerning our program of rapid tests, or if you are looking for solutions to a special application, please feel free to contact us:


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Rapid Tests from MACHEREY-NAGEL

New products

Test papers and test strips

QUANTOFIX® Arsenic Sensitive page 22



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QUANTOFIX® Total iron 100 page 25

QUANTOFIX® Total iron 1000 page 25

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VISOCOLOR®

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NANOCOLOR®

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NANOCONTROL NANOTURB page 130

Rapid Tests from MACHEREY-NAGEL

Approved

Certified in accordance to EN ISO 9001:2008

Our certified quality system and consistent quality standards assure products with constant high quality.

Competent

Over 100 years of experience

For over 100 years MACHEREY-NAGEL has been manufacturing test papers in Germany, controlling the entire value chain from R&D to after sales service. Over this time, our experience and our love for our products has resulted in satisfied customers all over the world. With our state of the art technology and proven products, MACHEREY-NAGEL customers are prepared to meet any analytical challenge in the future.

Extensive technical support

In addition to high quality products, customer care and service is core factor of MACHEREY-NAGEL's success. Our highly educated and trained customer service representatives, both in the field and in our service centers provide friendly expert help for any technical question you may have. We will be more than happy to support in finding a solution for your analytical challenge.

Free product information, flyers and seminars

We provide a wide range of information on our products, ranging from detailed instructions, flyers and brochures with background information to additional sources on our web page. Additionally, we offer seminars in Germany and many other parts of the world – obviously free of charge. Thus, customers can stay on top of recent developments and gain a high level of expertise in their analytical work.

Informative

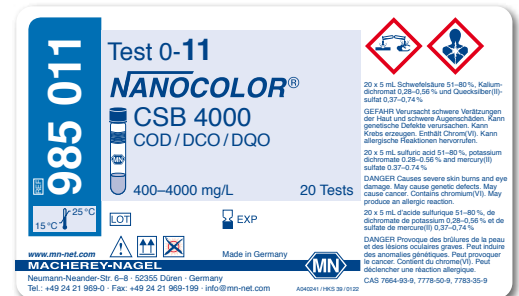
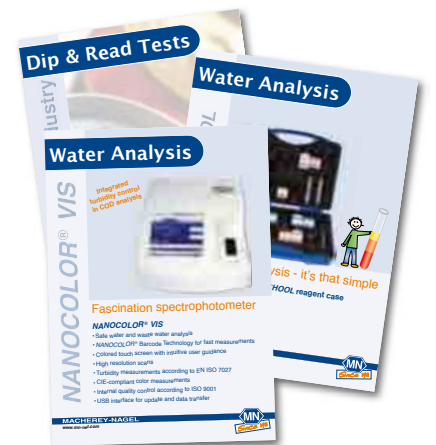
Material safety data sheets (Reach conform)

Already, MACHEREY-NAGEL complies to the new GHS labeling on many of our products and you can get all relevant MSDS online, also in new GHS format free of charge. Just go to www.mn-net.com/MSDS and download the information you need.

Clear labeling of products

All our products that contain hazardous substances are obviously labeled with all required information in accordance to international classification and labeling standards. You will even find many products that already comply to the new GHS labeling (1272/2008/EC), although it is only mandatory coming in 2015. Thus, customers can feel confident to know all necessary details about the products they work with, which makes using MACHEREY-NAGEL products especially safe and convenient.

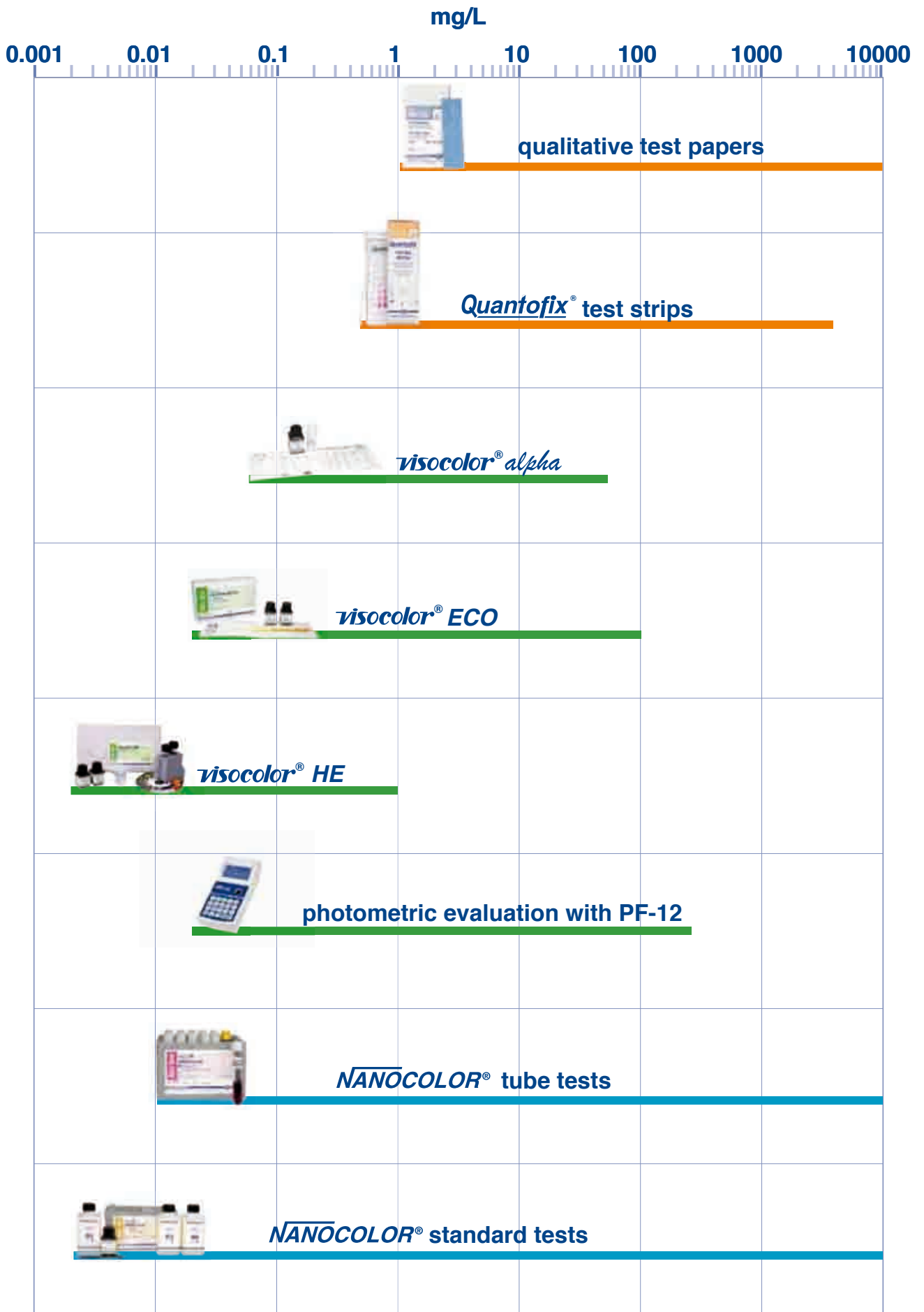
In addition, we supply you with all other necessary information on the product, such as storage conditions, shelf life, lot numbers and disposal advice, to provide you with the highest level of safety and comfort.



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Rapid Tests from MACHERY-NAGEL

Ranges of application



Agriculture and floriculture (soil analysis)



Copper
Cyanide
Hardness
Iron
Magnesium
Nitrate
Nitrite
Ammonium
Calcium
Carbonate hardness
Chloride
Chlorine
Phosphate
Potassium
pH

Breweries



Alkalinity
Aluminium
Ammonium
Calcium
Carbonate hardness
Chlorine
Chloride
Copper
Detergents
Hardness
Hydrazine
Iron
Magnesium
Manganese
Nitrate
Nitrite
pH
Phosphate
Residual hardness
Sulfate

Aquaculture and fish farming



Ammonium
Calcium
Carbonate hardness
Cyanide
Hardness
Iron
Magnesium
Manganese
Nitrate
Nitrite
Oxygen
pH
Phosphate
Sulfide

Cement and concrete production



Ammonium
Calcium
Carbonate hardness
Chloride
Chromium / Chromate
Hardness
Magnesium
Nitrate
pH
Sulfate

Boiler feed water



Calcium
Carbonate hardness
Chloride
Copper
DEHA
Hardness
Hydrazine
Iron
Magnesium
Oxygen
pH
Phosphate
Residual hardness
Silica
Sulfate
Sulfite
Zinc


Chemical industry




Alkalinity
Ammonium
Calcium
Carbonate hardness
Chlorine
Chloride
Chromium / Chromate
Copper
Cyanide
DEHA
Detergents
Fluoride
Hardness
Hydrazine
Iron
Magnesium
Manganese
Nickel
Nitrate
Nitrite
Oxygen
pH
Phosphate
Potassium
Residual hardness
Silica
Sulfate
Sulfide
Sulfite
Zinc


Rapid Tests from MACHEREY-NAGEL

Applications


Cooling water	
	Hardness
	Iron
	Magnesium
	Manganese
	Nitrate
	pH
Calcium	Phosphate
Carbonate hardness	Residual hardness
Chloride	Sulfate
Chlorine	

Drinking water	
	Copper
	Cyanide
	Fluoride
	Hardness
	Iron
	Magnesium
Aluminium	Manganese
Ammonium	Nickel
Calcium	Nitrate
Carbonate hardness	Nitrite
Chlorine	pH
Chloride	Sulfate
Chromium / Chromate	

Electroplating industry	
	Copper
	Cyanide
	Iron
	Nitrate
	Nitrite
	pH
Aluminium	Phosphate
Ammonium	Sulfate
Calcium	Sulfide
Chlorine	Sulfite
Chloride	Zinc
Chromium / Chromate	

Food and beverage industries	
	Fluoride
	Hardness
	Iron
	Magnesium
	Manganese
	Nitrate
Aluminium	Nitrite
Ammonium	pH
Calcium	Phosphate
Carbonate hardness	Residual hardness
Chloride	Sulfate
Chlorine	Sulfide
Chromium / Chromate	Sulfite
Copper	Zinc
Cyanide	

Industrial waste water	
	Detergents
	Iron
	Manganese
	Nitrate
	Nitrite
	Oxygen
Aluminium	pH
Ammonium	Phosphate
Chloride	Sulfate
Chlorine	Sulfide
Chromium / Chromate	Sulfite
Copper	Zinc
Cyanide	

Leather industry	
	Hardness
	Iron
	Magnesium
	Manganese
	Nitrate
	pH
Ammonium	Phosphate
Calcium	Residual hardness
Chloride	Sulfate
Chromium	







Metal processing industry	
	Detergents
	Iron
	Manganese
	Nickel
	Nitrate
	Nitrite
Aluminium	pH
Ammonium	Phosphate
Chloride	Silver
Chlorine	Sulfate
Chromium/Chromate	Sulfide
Cyanide	Sulfite
Copper	Zinc

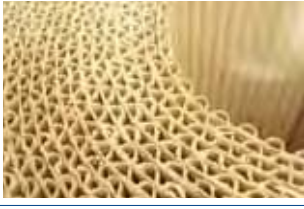
Photo industry	
	Chromium/Chromate
	Copper
	Cyanide
	Detergents
	Hardness
	Iron
Alkalinity	Magnesium
Calcium	Nitrite
Carbonate hardness	Oxygen
Chlorine	pH
Chloride	


Milk industry	
	Hardness
	Iron
	Magnesium
	Manganese
	Nitrate
	pH
Calcium	Phosphate
Carbonate hardness	Residual hardness
Chlorine	Sulfate
Chloride	

Pool and spa care	
	Ammonium
	Bromine
	Carbonate Hardness
	Chlorine
	Cyanuric acid
	pH
Aluminium	

Municipal waste water	
	COD
	Nitrate
	Nitrite
	total Nitrogen
	pH
	Ammonium
BOD ₅	TOC

Surface water and sea water	
	Hardness
	Iron
	Magnesium
	Manganese
	Nickel
	Nitrate
Aluminium	Nitrite
Ammonium	Oxygen
Calcium	pH
Carbonate hardness	Phosphate
Chloride	Residual hardness
Chlorine	Sulfate
Cyanide	Sulfide
Detergents	Zinc

Paper industry	
	Carbonate hardness
	Chlorine
	Hardness
	Magnesium
	pH
	Residual hardness
Calcium	

Textile industry	
	Chromium/Chromate
	Copper
	Hardness
	Magnesium
	Nickel
	pH
Aluminium	Potassium
Alkalinity	Residual hardness
Calcium	Sulfide
Carbonate hardness	Sulfite
Chlorine	Zinc

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Test strips and test papers

pH-Fix test strips

Unmatched pH testing enjoyment

Fast results

pH-Fix test strips allow fast pH testing directly at the point of interest. The easy Dip & Read procedure provides a reliable result within 10 seconds. Provided with a complete high quality color chart, pH-Fix does not need calibration and is immediately ready for use.

Patented color fixed indicator

The patented pH-Fix technology ensures optimal usability of the test strips. During production, the indicator is fixed to the test paper. The dye does not wash out so clothes stay clean and samples remain pure.

Easy and safe

For careful testing of dangerous, poisonous or aggressive liquids, pH-Fix test strips have the optimal design. The long plastic handle effectively protects the user from contact with the sample.



PEHANON®

Ideal pH test for colored samples

Accurate pH values

PEHANON® is a special pH test strip that unifies the pH indicator and the color chart on one strip. Any sample color has the same effect on both, the reference colors and the reactive pad. This ensures unadulterated and accurate readings in colored solutions.

Safe use

An invisible hydrophobic barrier just above the top color field prevents capillary action of the test solution beyond. The handle remains dry and clean. The user is safely protected from the sample.

Economic test

PEHANON® allows the pH determination without a separate color chart. Workers and machinists can use single strips instead of complete packs, which makes this test ideal for occasions, where many people have to perform the test in different locations.



pH indicator papers

Standard pH testing

pH indicator paper reels • general purpose pH determination

pH indicator papers have been on the market for decades and are the appreciated standard for many applications. For each pH value these papers show a single color which can be matched with the color scale at intervals of 0.2–1 pH unit.

Duotest • improved accuracy

These indicator papers show two different colors for each pH value at intervals of 0.3–1 pH unit. This allows more accurate reading and good estimation of intermediate values.

Tritest • most precise pH determination

For most precise reading, these papers show three different colors for each full pH unit. This ensures optimal color differences and allows good estimation of intermediate values.



Test strips and test papers

QUANTOFIX® test strips

Dip & Read tests for many substances

Fast results

QUANTOFIX® tests can be used for a large variety of different substances. In most cases, an easy Dip & Read procedure provides reliable results in 10–120 seconds.

Easy to use

All QUANTOFIX® tests are ready to use kits. They are calibrated and contain all necessary equipment and reagents. As “lab in the pocket” they are easy to use for professional analysts as well as chemical laymen.

Precise readings

The color charts are adjusted and checked using certified standard solutions. The user can be sure to receive accurate readings whenever he tests.



QUANTOFIX® Relax test strip reader

Perfect vision – exact results

Highest precision

The QUANTOFIX® Relax test strip reader is a revolutionary step in test strip analysis. The system provides users with entirely quantitative results across the complete measuring range, leading to higher accuracy and no in-between value guesswork. Thus customers can assure and back-up their decision making.

Objective results

The system is not influenced by external lighting conditions or human color perception. Therefore, the QUANTOFIX® Relax can generate reproducible results independent of the operator. So, working with the system increases reliability and comfort.

Easy result administration

The QUANTOFIX® Relax offers easy data storage and immediate print-outs using the inbuilt printer. Data can be easily transferred to a computer as well, thus providing a complete package for efficient, quick and comfortable data administration. Hence, the QUANTOFIX® Relax helps customers to document results easily while saving time in order to focus on their core business.



OEM-presentation

High quality products customized to your needs

Good quality – good image

Our partners highly appreciate private label products that boost the awareness for their business. The high quality of our products combined with the brand name of our partner build an invincible basis for success.

Easy creation of branded artwork

Our professional in-house design group creates private label artwork that meets and often exceeds the highest expectations. This ensures the consistent high quality of the finished goods and makes creating your own brand as easy as 1-2-3.

Successful none-compete products

We produce OEM tests for many different markets. Based on a close cooperation with our partners we convert their ideas with our underlying technology into optimum solutions. Together, we develop unique, innovative products that are highly profitable.



pH indicator papers

pH-Fix

pH-Fix – Unmatched pH test strips

With pH-Fix test strips, you can test the pH value quickly and easily directly at the point of interest. The strips are **ready to use** at any time and don't need any calibration, set-up or maintenance. Therefore, pH determination with pH-Fix test strips is very easy, regardless of your experience or chemical background.

The long plastic handle **safely protects you from** coming into **contact with the sample**. Thus, testing toxic, dangerous or aggressive substances is safely possible.

pH-Fix indicator test strips feature up to 4 different indicator pads that cover the whole pH range from 0–14. You can choose from a total of 14 different measuring ranges to find the ideal strip for your application.

The **brilliant color scale** is optimally matched and aligned to the test pads on the strips, resulting in quick, easy and safe pH determination.

In contrast to common indicator papers, the **indicator dyes** in pH-Fix test strips are **chemically bound** to the test pads. This patented technology safely prevents bleeding of dyes into the sample, even in highly alkaline solutions.

The special non-bleeding technology provides additional benefits for you:

- Even in weakly buffered solutions, a safe and reliable pH determination becomes possible, as the strips can be immersed for a long time until the final reaction color has developed.

- The colors of the individual test pads don't bleed and mix, which assures exact comparison to the color scale.
- Especially developed indicator dyes guarantee safe distinction between different pH values and flawless allocation of pad colors to the color scale.
- Your sample is not contaminated by indicator dyes. Consequently, you can use the solution for further analysis.



PlopTop tubes – clever and tough packaging for our best seller

The specially engineered PlopTop tubes can be opened and closed with just your thumb. Thus, working with pH-Fix becomes even more comfortable and easier.

Design and material guarantee a high degree of stability. The

tube is virtually unbreakable and stands firmly on any surface. As the tube is higher than the length of the strips, jamming of test strips when closing the tube are effectively prevented. Thus, you can easily close the tube at any time.

Ordering information

Test	Gradation	REF
Classic flat box with 100 test strips 6 x 85 mm		
pH-Fix 0–14	0 · 1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12 · 13 · 14	921 10
pH-Fix 0.0–6.0	0 · 0.5 · 1.0 · 1.5 · 2.0 · 2.5 · 3.0 · 3.5 · 4.0 · 4.5 · 5.0 · 5.5 · 6.0	921 15
pH-Fix 2.0–9.0	2.0 · 2.5 · 3.0 · 3.5 · 4.0 · 4.5 · 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0	921 18
pH-Fix 4.5–10.0 (CE ¹⁾)	4.5 · 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0 · 9.5 · 10.0	921 20
pH-Fix 6.0–10.0	6.0 · 6.4 · 6.7 · 7.0 · 7.3 · 7.6 · 7.9 · 8.2 · 8.4 · 8.6 · 8.8 · 9.1 · 9.5 · 10.0	921 22
pH-Fix 7.0–14.0	7.0 · 7.5 · 8.0 · 8.5 · 9.0 · 9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0 · 13.5 · 14.0	921 25
pH-Fix 0.3–2.3	0.3 · 0.7 · 1.0 · 1.3 · 1.6 · 1.9 · 2.3	921 80
pH-Fix 1.7–3.8	1.7 · 2.0 · 2.3 · 2.6 · 2.9 · 3.2 · 3.5 · 3.8	921 90
pH-Fix 3.1–8.3 (CE ¹⁾)	3.1 · 3.5 · 3.9 · 4.3 · 4.7 · 5.1 · 5.5 · 5.9 · 6.3 · 6.7 · 7.1 · 7.5 · 7.9 · 8.3	921 35
pH-Fix 3.6–6.1 (CE ^{1) 2)})	3.6 · 4.1 · 4.4 · 4.7 · 5.0 · 5.3 · 5.6 · 6.1	921 30
pH-Fix 5.1–7.2	5.1 · 5.4 · 5.7 · 6.0 · 6.3 · 6.6 · 6.9 · 7.2	921 40
pH-Fix 6.0–7.7	6.0 · 6.4 · 6.7 · 7.0 · 7.3 · 7.7	921 50
pH-Fix 7.5–9.5	7.5 · 7.9 · 8.2 · 8.4 · 8.6 · 8.8 · 9.1 · 9.5	921 60
pH-Fix 7.9–9.8	7.9 · 8.3 · 8.6 · 8.9 · 9.1 · 9.4 · 9.8	921 70
PlopTop tube with 100 test strips 6 x 85 mm		
pH-Fix 0–14 PT	0 · 1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12 · 13 · 14	921 11
pH-Fix 3.6–6.1 PT (CE ^{1) 2)})	3.6 · 4.1 · 4.4 · 4.7 · 5.0 · 5.3 · 5.6 · 6.1	921 31
pH-Fix 4.5–10.0 PT (CE ¹⁾)	4.5 · 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0 · 9.5 · 10.0	921 21

CE: CE-marked according to ¹⁾ the IvD-directive 98/79/EG ²⁾ the directive for medical products 93/42/EWG

PEHANON® – pH measurement in colored samples

PEHANON® is a special pH indicator test strip that unifies the pH indicator and the reference colors on one strip and has the following **benefits**:

Any sample color has the same effect on both the reference colors and the reactive pad. This ensures unadulterated readings in colored solutions. The user can be sure to get **accurate** pH values.

An invisible hydrophobic barrier just above the top color field

prevents capillary action of the test solution beyond. The handle will remain dry and clean whatever the sample is. This makes using the strip very **safe**.

pH values can be determined without a separate color chart. Workers and machinists can use single strips instead of complete packs with color chart, which makes PEHANON® **eco-nomic**.

Ordering information

Test	Gradation	Presentation	REF
PEHANON® 1–12	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12	200 strips 11 x 100 mm	904 01
PEHANON® 0–1.8	0 · 0.3 · 0.6 · 0.8 · 1.0 · 1.2 · 1.5 · 1.8	200 strips 11 x 100 mm	904 11
PEHANON® 1.0–2.8	1.0 · 1.3 · 1.6 · 1.8 · 2.0 · 2.2 · 2.5 · 2.8	200 strips 11 x 100 mm	904 12
PEHANON® 1.8–3.8	1.8 · 2.1 · 2.4 · 2.7 · 3.0 · 3.2 · 3.5 · 3.8	200 strips 11 x 100 mm	904 13
PEHANON® 2.8–4.6	2.8 · 3.1 · 3.4 · 3.6 · 3.8 · 4.0 · 4.3 · 4.6	200 strips 11 x 100 mm	904 14
PEHANON® 3.8–5.5	3.8 · 4.0 · 4.2 · 4.4 · 4.6 · 4.9 · 5.2 · 5.5	200 strips 11 x 100 mm	904 15
PEHANON® 4.0–9.0	4.0 · 4.5 · 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0	200 strips 11 x 100 mm	904 24
PEHANON® 5.2–6.8	5.2 · 5.5 · 5.7 · 5.9 · 6.1 · 6.3 · 6.5 · 6.8	200 strips 11 x 100 mm	904 16
PEHANON® 6.0–8.1	6.0 · 6.3 · 6.6 · 6.9 · 7.2 · 7.5 · 7.8 · 8.1	200 strips 11 x 100 mm	904 17
PEHANON® 7.2–8.8	7.2 · 7.4 · 7.6 · 7.8 · 8.0 · 8.2 · 8.5 · 8.8	200 strips 11 x 100 mm	904 19
PEHANON® 8.0–9.7	8.0 · 8.2 · 8.4 · 8.6 · 8.8 · 9.1 · 9.4 · 9.7	200 strips 11 x 100 mm	904 20
PEHANON® 9.5–12.0	9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0	200 strips 11 x 100 mm	904 21
PEHANON® 10.5–13.0	10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0	200 strips 11 x 100 mm	904 22
PEHANON® 12.0–14.0	12.0 · 12.5 · 13.0 · 13.5 · 14.0	200 strips 11 x 100 mm	904 23



pH indicator papers

Universal and special indicator papers

pH indicator papers – standard for many applications

pH indicator papers have been on the market for decades and are the standard for many applications. For each pH value these papers show a single color which can be matched with the color scale at intervals of 0.2–1 pH.

The characteristic features of pH indicator papers are:

- pH indicators are supplied in plastic reels that ensure long-term stability and protection against many external influences. The indicator paper will **always** be **ready-to-use** when needed.
- pH indicators are manufactured from high quality filter papers from MACHEREY-NAGEL. Combined with our ISO 9001 quality control scheme this ensures optimal quality. The user will always get **reliable readings**.
- The colors of the color scales are specially mixed to perfectly match the reaction color of the indicator papers. This makes the reading of results **easy and accurate**.



Ordering information

Test	Gradation	Presentation	REF
Universal indicator papers			
Universal indicator paper 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	reel of 5 m x 7 mm	902 01
Universal indicator paper 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	refill pack of 3 reels	902 02
Universal indicator paper 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	booklet of 100 strips 10 x 70 mm	902 03
Universal indicator paper 1–14	1 · 2 · 3 · 5 · 6 · 7 · 8 · 9 · 10 · 12 · 14	reel of 5 m x 7 mm	902 04
Universal indicator paper 1–14	1 · 2 · 3 · 5 · 6 · 7 · 8 · 9 · 10 · 12 · 14	refill pack of 3 reels	902 24
Special indicator papers			
Special indicator paper 0.5–5.5	0.5 · 1.0 · 1.5 · 2.0 · 2.5 · 3.0 · 3.5 · 4.0 · 4.5 · 5.0 · 5.5	reel of 5 m x 7 mm	902 05
Special indicator paper 0.5–5.5	0.5 · 1.0 · 1.5 · 2.0 · 2.5 · 3.0 · 3.5 · 4.0 · 4.5 · 5.0 · 5.5	refill pack of 3 reels	902 25
Special indicator paper 3.8–5.8	<3.8 · 3.8 · 4.1 · 4.3 · 4.5 · 4.7 · 4.9 · 5.2 · 5.5 · 5.8 · >5.8	reel of 5 m x 7 mm	902 06
Special indicator paper 3.8–5.8	<3.8 · 3.8 · 4.1 · 4.3 · 4.5 · 4.7 · 4.9 · 5.2 · 5.5 · 5.8 · >5.8	refill pack of 3 reels	902 26
Special indicator paper 4.0–7.0	4.0 · 4.3 · 4.6 · 4.9 · 5.2 · 5.5 · 5.8 · 6.1 · 6.4 · 6.7 · 7.0	reel of 5 m x 7 mm	902 07
Special indicator paper 4.0–7.0	4.0 · 4.3 · 4.6 · 4.9 · 5.2 · 5.5 · 5.8 · 6.1 · 6.4 · 6.7 · 7.0	refill pack of 3 reels	902 27
Special indicator paper 5.4–7.0	<5.4 · 5.4 · 5.7 · 6.0 · 6.2 · 6.4 · 6.7 · 7.0 · >7.0	reel of 5 m x 7 mm	902 08
Special indicator paper 5.4–7.0	<5.4 · 5.4 · 5.7 · 6.0 · 6.2 · 6.4 · 6.7 · 7.0 · >7.0	refill pack of 3 reels	902 28
Special indicator paper 5.5–9.0	5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0	reel of 5 m x 7 mm	902 09
Special indicator paper 5.5–9.0	5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0	refill pack of 3 reels	902 29
Special indicator paper 6.4–8.0	<6.4 · 6.4 · 6.6 · 6.8 · 7.0 · 7.2 · 7.4 · 7.6 · 7.8 · 8.0 · >8.0	reel of 5 m x 7 mm	902 10
Special indicator paper 6.4–8.0	<6.4 · 6.4 · 6.6 · 6.8 · 7.0 · 7.2 · 7.4 · 7.6 · 7.8 · 8.0 · >8.0	refill pack of 3 reels	902 30
Special indicator paper 7.2–9.7	<7.2 · 7.2 · 7.5 · 7.8 · 8.1 · 8.4 · 8.7 · 9.0 · 9.3 · 9.7 · >9.7	reel of 5 m x 7 mm	902 11
Special indicator paper 7.2–9.7	<7.2 · 7.2 · 7.5 · 7.8 · 8.1 · 8.4 · 8.7 · 9.0 · 9.3 · 9.7 · >9.7	refill pack of 3 reels	902 31
Special indicator paper 8.0–10.0	8.0 · 8.2 · 8.4 · 8.7 · 9.0 · 9.2 · 9.6 · 10.0	reel of 5 m x 7 mm	902 12
Special indicator paper 8.0–10.0	8.0 · 8.2 · 8.4 · 8.7 · 9.0 · 9.2 · 9.6 · 10.0	refill pack of 3 reels	902 32
Special indicator paper 9.0–13.0	9.0 · 9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0	reel of 5 m x 7 mm	902 13
Special indicator paper 9.0–13.0	9.0 · 9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0	refill pack of 3 reels	902 33
Special indicator paper 12.0–14.0	12.0 · 12.5 · 13.0 · 13.5 · 14.0	reel of 5 m x 7 mm	902 14
Special indicator paper 12.0–14.0	12.0 · 12.5 · 13.0 · 13.5 · 14.0	refill pack of 3 reels	902 34
Multipacks			
pH-Set U-10	Box with 10 different reels of pH indicator paper (2 reels of universal indicator paper and 8 reels of different special indicator papers)		902 19
TRI-BOX	Plastic dispenser with 3 reels of special indicator paper each (1 reel each of pH 0.5–5.5; pH 5.5–9.0; pH 9.0–13.0) and 3 color scales		902 18

Duotest – two indicator zones for higher accuracy

Duotest indicator paper features **two different indicator zones** on one single paper. The zones are separated by a **hydrophobic barrier**, which effectively prevents mixing of the

reaction colors and **increases mechanical stability**. Clear color differences allow you to safely estimate intermediate values, which in turn increases measurement accuracy.

Tritest – three indicator zones for highest precision

Tritest indicator paper has **three different indicator zones** on one single paper. The three zones guarantee optimal color differences and safe determination of in-between values. Tritest indicator papers are available for a pH range from 1–11 and feature 1 pH unit increments.

Two options are available:

- Tritest in a reel (without hydrophobic barrier)
Width 10 mm, three indicator zones right next to each other, no partition
- Tritest L in a reel (with 2 hydrophobic barriers)
Width 14 mm, three indicator zones, separated by two hydrophobic barriers. Even in strongly alkaline solutions, the colors of the zones do not mix.



Ordering information

Test	Gradation	Presentation	REF
Duotest			
Duotest 1–12	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12	reel of 5 m x 10 mm	903 01
Duotest 1–12	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12	refill pack of 3 reels	903 11
Duotest 1.0–4.3	1.0 · 1.3 · 1.6 · 1.9 · 2.2 · 2.5 · 2.8 · 3.1 · 3.4 · 3.7 · 4.0 · 4.3	reel of 5 m x 10 mm	903 02
Duotest 1.0–4.3	1.0 · 1.3 · 1.6 · 1.9 · 2.2 · 2.5 · 2.8 · 3.1 · 3.4 · 3.7 · 4.0 · 4.3	refill pack of 3 reels	903 12
Duotest 3.5–6.8	3.5 · 3.8 · 4.1 · 4.4 · 4.7 · 5.0 · 5.3 · 5.6 · 5.9 · 6.2 · 6.5 · 6.8	reel of 5 m x 10 mm	903 03
Duotest 3.5–6.8	3.5 · 3.8 · 4.1 · 4.4 · 4.7 · 5.0 · 5.3 · 5.6 · 5.9 · 6.2 · 6.5 · 6.8	refill pack of 3 reels	903 13
Duotest 5.0–8.0	5.0 · 5.3 · 5.6 · 5.9 · 6.2 · 6.5 · 6.8 · 7.1 · 7.4 · 7.7 · 8.0	reel of 5 m x 10 mm	903 04
Duotest 5.0–8.0	5.0 · 5.3 · 5.6 · 5.9 · 6.2 · 6.5 · 6.8 · 7.1 · 7.4 · 7.7 · 8.0	refill pack of 3 reels	903 14
Duotest 7.0–10.0	7.0 · 7.3 · 7.6 · 7.9 · 8.2 · 8.5 · 8.8 · 9.1 · 9.4 · 9.7 · 10.0	reel of 5 m x 10 mm	903 05
Duotest 7.0–10.0	7.0 · 7.3 · 7.6 · 7.9 · 8.2 · 8.5 · 8.8 · 9.1 · 9.4 · 9.7 · 10.0	refill pack of 3 reels	903 15
Duotest 9.5–14.0	9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0 · 13.5 · 14.0	reel of 5 m x 10 mm	903 06
Duotest 9.5–14.0	9.5 · 10.0 · 10.5 · 11.0 · 11.5 · 12.0 · 12.5 · 13.0 · 13.5 · 14.0	refill pack of 3 reels	903 16
pH-Set D 10	Collection of Duotest indicator papers (2 reels of 1–12; 3.5–6.8; 5.0–8.0; 7.0–10.0; 1 reel of 1.0–4.3 and 9.5–14.0)		903 19
Tritest			
Tritest pH 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	reel of 5 m x 10 mm	905 01
Tritest pH 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	refill pack of 3 reels	905 02
Tritest L pH 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	reel of 6 m x 14 mm	905 10
Tritest L pH 1–11	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11	refill pack of 3 reels	905 11



pH indicator papers

UNISOL

UNISOL liquid indicators

UNISOL are indicator solutions that are directly applied to the sample. The resulting color of the sample is compared to a color chart that is included in the kit. UNISOL indicator solutions are especially **suitable for** pH measurement in **non-buffered samples** like pure water or surface water. In these samples, other indicator papers find their limit of applicability.



Ordering information

Type	Range	Gradation	Presentation	REF
UNISOL indicator solutions				
UNISOL 410*	pH 4.0–10.0	0.5	100 mL in drop bottle, color scale, 1 plastic cuvette MN 13/72	910 02
UNISOL 113*	pH 1.0–13.0	1.0	100 mL in drop bottle, color scale, 1 plastic cuvette MN 13/72	910 31
UNISOL accessories				
Plastic cuvettes MN 13/72			pack of 5	910 39
* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.				

Indicator papers without color scale

Simple acid/base determination

These products are simple, completely impregnated indicator papers. They indicate if the pH of solution is above or below the point of color change. They are **useful to distinguish between acids and bases**.



Ordering information

Test	Measuring range	Color change	Presentation	REF
Brilliant yellow paper	6.7–7.9	yellow → red	box of 200 strips 20 x 70 mm	907 01
Congo paper MN 816 N*	5.0–3.0	red → blue	reel of 5 m x 7 mm	907 02
Congo paper MN 816 N*	5.0–3.0	red → blue	refill pack of 3 reels	907 03
Congo paper MN 616 T*	5.0–3.0	red → blue	box of 200 strips 20 x 70 mm	907 04
Congo paper MN 260 HE*	5.0–3.0	red → blue	box of 200 strips 20 x 70 mm	907 05
Litmus paper blue	8.0–5.0	blue → red	reel of 5 m x 7 mm	911 06
Litmus paper blue	8.0–5.0	blue → red	refill pack of 3 reels	911 16
Litmus paper blue	8.0–5.0	blue → red	booklet of 100 strips 10 x 70 mm	911 26
Litmus paper neutral	5.0–8.0	red ← violet → blue	reel of 5 m x 7 mm	911 07
Litmus paper neutral	5.0–8.0	red ← violet → blue	refill pack of 3 reels	911 17
Litmus paper neutral	5.0–8.0	red ← violet → blue	booklet of 100 strips 10 x 70 mm	911 27
Litmus paper red	5.0–8.0	red → blue	reel of 5 m x 7 mm	911 08
Litmus paper red	5.0–8.0	red → blue	refill pack of 3 reels	911 18
Litmus paper red	5.0–8.0	red → blue	booklet with 100 strips 10 x 70 mm	911 28
Nitrazine yellow paper	6.0–7.0	yellow → violet-blue	box of 200 strips 20 x 70 mm	907 11
Phenolphthalein paper	8.3–10.0	white → red	roll of 5 m x 7 mm	907 12
Phenolphthalein paper	8.3–10.0	white → red	refill pack of 3 reels	907 13
* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.				

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® – Quick, easy, safe

QUANTOFIX® test strips meet all requirements of a modern rapid test. They are **immediately ready-to-use** and can be utilized right away at the point of interest. To run a test you don't need any equipment or accessories. Thus, you save time and work more economically.



Test papers

Ordering information

Test	Gradation	REF
QUANTOFIX® Aluminum* ¹⁾	0 · 5 · 20 · 50 · 200 · 500 mg/L Al ³⁺	913 07
QUANTOFIX® Ammonium* ¹⁾	0 · 10 · 25 · 50 · 100 · 200 · 400 mg/L NH ₄ ⁺	913 15
QUANTOFIX® Arsenic 10* ¹⁾	0 · 0.01 · 0.025 · 0.05 · 0.1 · 0.5 mg/L As ^{3+/5+}	913 34
QUANTOFIX® Arsenic 50* ¹⁾	0 · 0.05 · 0.1 · 0.5 · 1.0 · 1.7 · 3.0 mg/L As ^{3+/5+}	913 32
QUANTOFIX® Arsenic Sensitive* ¹⁾ NEW!	0 · 0.005 · 0.01 · 0.025 · 0.05 · 0.1 · 0.25 · 0.5 mg/L As ^{3+/5+}	913 45
QUANTOFIX® Ascorbic acid	0 · 50 · 100 · 200 · 300 · 500 · 1000 · 2000 mg/L vitamin C	913 14
QUANTOFIX® Calcium* ¹⁾	0 · 10 · 25 · 50 · 100 mg/L Ca ²⁺	913 24 ²⁾
QUANTOFIX® Carbonate hardness	0 · 3.8 · 7.5 · 12.5 · 18.8 · 25.0 °e	913 23
QUANTOFIX® Chloride	0 · 500 · 1000 · 1500 · 2000 · ≥ 3000 mg/L Cl ⁻	913 21
QUANTOFIX® Chlorine* ¹⁾	0 · 1 · 3 · 10 · 30 · 100 mg/L Cl ₂	913 17
QUANTOFIX® Chlorine Sensitive CE	0 · 0.1 · 0.5 · 1 · 3 · 10 mg/L Cl ₂	913 39
QUANTOFIX® Chromate* ¹⁾	0 · 3 · 10 · 30 · 100 mg/L CrO ₄ ²⁻	913 01
QUANTOFIX® Cobalt	0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L Co ²⁺	913 03
QUANTOFIX® Copper	0 · 10 · 30 · 100 · 300 mg/L Cu ⁺²⁺	913 04
QUANTOFIX® Cyanide* ¹⁾	0 · 1 · 3 · 10 · 30 mg/L CN ⁻	913 18
QUANTOFIX® EDTA	0 · 100 · 200 · 300 · 400 mg/L EDTA	913 35
QUANTOFIX® Formaldehyde* ¹⁾	0 · 10 · 20 · 40 · 60 · 100 · 200 mg/L HCHO	913 28
QUANTOFIX® Glucose NEW!	0 · 50 · 100 · 250 · 500 · 1000 · 2000 mg/L glucose	913 48
QUANTOFIX® Glutaraldehyde	0 · 0.5 · 1 · 1.5 · 2 · 2.5 % glutaraldehyde	913 43
QUANTOFIX® Total iron 100 NEW!	0 · 2 · 5 · 10 · 25 · 50 · 100 mg/L Fe ^{2+/3+}	913 44
QUANTOFIX® Total iron 1000 NEW!	0 · 5 · 20 · 50 · 100 · 250 · 500 · 1000 mg/L Fe ^{2+/3+}	913 30
QUANTOFIX® LubriCheck	0 · 15 · 50 · 75 · 130 · 200 mmol/L KOH	913 36
QUANTOFIX® Molybdenum* ¹⁾	0 · 5 · 20 · 50 · 100 · 250 mg/L Mo ⁶⁺	913 25
QUANTOFIX® Nickel	0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L Ni ²⁺	913 05
QUANTOFIX® Nitrate/Nitrite	0 · 10 · 25 · 50 · 100 · 250 · 500 mg/L NO ₃ ⁻ 0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO ₂ ⁻	913 13
QUANTOFIX® Nitrite	0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO ₂ ⁻	913 11
QUANTOFIX® Nitrite 3000	0 · 0.1 · 0.3 · 0.6 · 1 · 2 · 3 g/L NO ₂ ⁻	913 22
QUANTOFIX® Nitrite/pH	0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO ₂ ⁻ pH 6.0 · 6.4 · 6.7 · 7.0 · 7.3 · 7.6 · 7.9 · 8.2 · 8.4 · 8.6 · 8.8 · 9.0 · 9.3 · 9.6	913 38
QUANTOFIX® Peracetic acid 50 CE	0 · 5 · 10 · 20 · 30 · 50 mg/L peracetic acid	913 40
QUANTOFIX® Peracetic acid 500 CE	0 · 50 · 100 · 200 · 300 · 400 · 500 mg/L peracetic acid	913 41
QUANTOFIX® Peracetic acid 2000 CE	0 · 500 · 1000 · 1500 · 2000 mg/L peracetic acid	913 42
QUANTOFIX® Peroxide 25	0 · 0.5 · 2 · 5 · 10 · 25 mg/L H ₂ O ₂	913 19
QUANTOFIX® Peroxide 100 CE	0 · 1 · 3 · 10 · 30 · 100 mg/L H ₂ O ₂	913 12
QUANTOFIX® Peroxide 1000	0 · 50 · 150 · 300 · 500 · 800 · 1000 mg/L H ₂ O ₂	913 33
QUANTOFIX® Phosphate* ¹⁾	0 · 3 · 10 · 25 · 50 · 100 mg/L PO ₄ ³⁻	913 20
QUANTOFIX® Potassium ¹⁾	0 · 200 · 400 · 700 · 1000 · 1500 mg/L K ⁺	913 16
QUANTOFIX® QUAT	0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L benzalkonium-chloride	913 37
QUANTOFIX® Sulfate	< 200 · > 400 · > 800 · > 1200 · > 1600 mg/L SO ₄ ²⁻	913 29
QUANTOFIX® Sulfite	0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L SO ₃ ²⁻	913 06
QUANTOFIX® Tin	0 · 10 · 25 · 50 · 100 · 250 · 500 mg/L Sn ²⁺	913 09
QUANTOFIX® Zinc* ¹⁾	0 · 2 · 5 · 10 · 25 · 50 · 100 mg/L Zn ²⁺	913 10
QUANTOFIX® Multi-stick for aquarium owners	total hardness 0 · 6.3 · 12.5 · 18.8 · 25.0 · 31.3 °e carbonate hardness 0 · 3.8 · 7.5 · 12.5 · 18.8 · 25.0 °e pH 6.4 · 6.8 · 7.2 · 7.6 · 8.0 · 8.4	913 26 913 27 ³⁾

Presentation: Container with 100 test strips 6 x 95 mm

¹⁾ The tests are supplied complete with all reagents required for the determination

²⁾ Presentation: Container with 60 test strips ³⁾ Presentation: Container with 25 test strips

CE: CE-marked according to the directive for medical products 93/42/EWG

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Aluminum

REF 913 07

This test allows the quick and easy determination of aluminum in solutions. It comes with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 2 minutes.

Aluminum is the third most abundant element in the earth's crust. In nature, aluminium only occurs in chemical compounds. In early stages of water treatment, aluminum compounds called alums are used as coagulation aids.

QUANTOFIX® Aluminum is used to check the integrity of the filtering system.

Type:	test strips and reagents
Range:	0 · 5 · 20 · 50 · 200 · 500 mg/L Al ³⁺
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	pink → red

QUANTOFIX® Ammonium

REF 913 15

This test allows the quick and easy determination of ammonium in solutions. It comes with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 10 seconds.

In nature, ammonia results from the biological decay of plant and animal matter. High concentrations can be found in rural, farming areas where fertilizers are regularly used. Also, industrial effluents may contain ammonia in higher levels. Ammonia itself is relatively harmless. Depending on the pH, however, part of the ammonium is transformed to the aggressive NH₃-gas, which is poisonous to aquatic life. Ammonium levels > 1 mg/L are not suitable for fish.

As an indicator for decomposition of animal or vegetable substances, control of ammonium is also important for the water supply.

Type:	test strips and reagents
Range:	0 · 10 · 25 · 50 · 100 · 200 · 400 mg/L NH ₄ ⁺
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	bright yellow → orange

QUANTOFIX® Arsenic 10

REF 913 34

This test allows the quick and easy determination of arsenic in solutions. It comes with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 10 minutes.

As a naturally occurring element, arsenic is widely distributed in the Earth's crust. In the natural environment it is most frequently present as inorganic arsenic compound in combination with sulphur or oxygen. Organic arsenic compounds can be used as pesticides.

Arsenic is toxic and causes skin diseases, keratosis and melanoma. Therefore, arsenic levels in drinking water have to be monitored thoroughly.

The WHO recommends a threshold value for drinking water of 0.01 mg/L. This concentration can reliably be monitored with QUANTOFIX® Arsenic 10.

Type:	test strips and reagents
Range:	0.01 · 0.025 · 0.05 · 0.1 · 0.5 mg/L As ^{3+/5+}
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	white → yellow-brown

QUANTOFIX® Arsenic 50

REF 913 32

Similar to QUANTOFIX® Arsenic 10 but different range.

Type:	test strips and reagents
Range:	0 · 0.05 · 0.1 · 0.5 · 1.0 · 1.7 · 3.0 mg/L As ^{3+/5+}
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	white → yellow-brown

QUANTOFIX® Arsenic Sensitive **NEW!**

REF 913 45

Similar to QUANTOFIX® Arsenic 10 but more sensitive

Type:	test strips and reagents
Range:	0 · 0.005 · 0.01 · 0.025 · 0.05 · 0.1 · 0.25 · 0.5 mg/L As ^{3+/5+}
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	white → yellow-brown



QUANTOFIX® Ascorbic acid

REF 913 14

This test strip is for the rapid and reliable determination of ascorbic acid in food. The easy Dip & Read procedure provides a reliable result within 30 seconds.

Ascorbic acid or vitamin C is naturally found in many foods and vegetables. It is also added to juices or fruits as stabilizing and reducing agent. QUANTOFIX® Ascorbic acid allows the quick and easy determination of vitamin C in fruit juices as well as on fresh cut surfaces of fruits and vegetables.

Type:	test strips
Range:	0 · 50 · 100 · 200 · 300 · 500 · 1000 · 2000 mg/L vitamin C
Sufficient for:	100 tests
Shelf life:	at least 2.5 years after production
Color change:	yellow → green-blue

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Calcium

REF 913 24

This test allows the quick and easy determination of calcium in solutions. The kit contains with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 1 minute.

Calcium is an important element in nutrition and is therefore tested in foodstuff. It is essential for the building of human bones. Lack of calcium in the daily diet may lead to osteoporosis. The recommended consumption is about 1000 mg/day.

In combination with magnesium, calcium is responsible for water hardness.

Type: test strips and reagents
Range: 0 · 10 · 25 · 50 · 100 mg/L Ca²⁺
Sufficient for: 60 tests
Shelf life: at least 2.5 years after production
Color change: yellow → red

QUANTOFIX® Carbonate hardness

REF 913 23

This test strip is for the fast and reliable determination of alkalinity or carbonate hardness in water. The easy Dip & Read procedure provides a reliable result within 30 seconds.

Carbonate hardness or alkalinity is a measure for the water's pH buffer capacity. If the carbonate hardness is higher, addition of acids or bases will have a lower influence on the resulting pH. Sudden and rapid pH changes of the water are avoided.

QUANTOFIX® Carbonate hardness is used for the quick and easy control of water in swimming pools and aquariums.

Type: test strips
Range: 0 · 3.8 · 7.5 · 12.5 · 18.8 · 25.0 °e
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: bright green → blue

QUANTOFIX® Chloride

REF 913 21

This test strip is for the fast and reliable determination of chloride in solutions. The easy Dip & Read procedure provides a reliable result within 1 minute.

Chloride ions occur in all natural waters. Their concentration depends on the geological and local situation. In waste waters and polluted rivers the chloride concentration can reach high values. In combination with sodium, chloride forms NaCl or table salt.

Type: test strips
Range: 0 · 500 · 1000 · 1500 · 2000 ·
≥ 3000 mg/L Cl⁻
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
at 2–8 °C
Color change: brown → yellow

QUANTOFIX® Chlorine

REF 913 17

This test allows the quick and easy determination of chlorine in solutions. It comes with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 1 minute.

Chlorine is widely used for disinfection of swimming pools, water mains and water reservoirs. Dosed correctly, harmful microorganisms are safely destroyed, many impurities removed and the growth of algae is prevented. Electroplaters use chlorine for the detoxification of cyanide-containing waste.

Regular checking of the chlorine concentration is essential to keep it at the desired level. Excessive chlorine not only impairs the smell and taste of water but can also be hazardous.

In water chlorine occurs either free or bound for example as chloramines. Total chlorine is the sum of both levels.

For the sensitive determination of chlorine in swimming pools we recommend our swimming pool tests (s. page 36)

Type: test strips and reagents
Range: 0 · 1 · 3 · 10 · 30 · 100 mg/L Cl₂
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → red-violet

QUANTOFIX® Chlorine Sensitive

REF 913 39

This test allows the quick and easy detection of low levels of total chlorine (total chloramines). The easy Dip & Read procedure provides reliable results within 30 seconds.

In dialysis centres QUANTOFIX® Chlorine Sensitive is used to check feed water. Low levels of total chlorine (total chloramines) are necessary to ensure optimal function of further water purification such as reversed osmosis. It also provides a fast and convenient means to test for residual chlorine in rinse water after disinfection.

Type: test strips
Range: 0 · 0.1 · 0.5 · 1 · 3 · 10 mg/L Cl₂
Sufficient for: 100 tests
Shelf life: at least 2 years after production
Color change: yellow → violet



Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Chromate

REF 913 01

This test allows the quick and easy determination of chromate in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 30 seconds.

Many chromate compounds are poisonous and carcinogenic. They are used for example in chrome plating and tanning. QUANTOFIX® Chromate is used for the easy monitoring of water discharged from such plants.

Type: test strips and reagents
 Range: 0 · 3 · 10 · 30 · 100 mg/L CrO₄²⁻
 Sufficient for: 100 tests
 Shelf life: at least 2 years after production
 Color change: white → violet



QUANTOFIX® Cobalt

REF 913 03

This test strip is for the fast and reliable determination of cobalt in solutions. The easy Dip & Read procedure provides a reliable result within 20 seconds.

Cobalt is also used for metal alloys and can in other compounds be part of catalysts. QUANTOFIX® Cobalt is used to monitor waste water and for non-destructive testing of materials.

Type: test strips
 Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L Co²⁺
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → green-blue

QUANTOFIX® Copper

REF 913 04

This test strip is for the fast and reliable determination of copper in solutions. The easy Dip & Read procedure provides a reliable result within 20 seconds.

Copper or copper-compounds are used for electroplating processes, the production of water pipes etc. QUANTOFIX® Copper is used for the quick and easy monitoring of electroplating solutions, waste water, tap water and in many other applications.

Type: test strips
 Range: 0 · 10 · 30 · 100 · 300 mg/L Cu⁺²⁺
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → red-violet

QUANTOFIX® Cyanide

REF 913 18

This test allows the quick and easy determination of cyanide in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 3 minutes.

Cyanide is extremely poisonous. The lethal dose is 1 mg/kg weight. Careful control of the cyanide concentration is therefore essential, whenever cyanides are used for industrial processes like for example electroplating or gold-mining. Cyanide control is also important during the production of fruit-brandies made from stone fruits.

Type: test strips and reagents
 Range: 0 · 1 · 3 · 10 · 30 mg/L CN⁻
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → violet



QUANTOFIX® EDTA

REF 913 35

This test strip is for the fast and reliable determination of EDTA, NTA and other complexing agents in solutions. The easy Dip & Read procedure provides a reliable result within 15 seconds.

Complexing agents like EDTA (Ethylenediaminetetraacetate) or NTA (Nitrilotriacetic acid) have replaced phosphates as additives in washing and cleaning solutions. QUANTOFIX® EDTA is therefore ideal to check the concentration of washing and cleaning solutions.

In proteomics labs EDTA is also used to regenerate Ni- and Co-precharged chromatography columns (HPLC columns) which are used to purify recombinant proteins. Prior to the successive analysis, QUANTOFIX® EDTA is used to control if EDTA has completely rinsed out. This may dramatically reduce the rinse time and therefore increase the throughput and the capacity.

The following complexing agents can also be determined: nitrilotriacetic acid (NTA), cyclohexanedinitrilo-(1,2)-tetraacetic acid, diethyltrinitrilopentaacetic acid, bis(aminoethyl) glykol-ether-*N,N,N',N'*-tetraacetic acid.

Conversion factor: 1 mg/L EDTA = 0.7 mg/L NTA

Type: test strips
 Range: 0 · 100 · 200 · 300 · 400 mg/L EDTA
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: red → yellow

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Formaldehyde

REF 913 28

This test allows the quick and easy determination of formaldehyde. It comes with all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 1 minute.

Formaldehyde is used for a large variety of products, ranging from shampoo to clothes. In large quantities it is used as raw material in the chemical industry. Formaldehyde is poisonous and can cause allergic reactions as well as irritations of skin, eyes and air passages. If such reactions are observed after contact with suspicious substances it may be useful to control the formaldehyde concentration.

In closed cooling or heating circuits formaldehyde is used as biocide. Here, QUANTOFIX® Formaldehyde serves to easily monitor the system.

Type: test strips and reagents
Range: 0 · 10 · 20 · 40 · 60 · 100 · 200 mg/L
HCHO
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: beige → blue-violet

QUANTOFIX® Glucose **NEW!**

REF 913 48

This test strip is for the easy and reliable detection of glucose in solutions. The simple Dip & Read procedure provides reliable results within 30 seconds.

Glucose is a major part in most foods, in potatoes for example, the glucose content is an important quality criterion.

Type: test strips
Range: 0 · 50 · 100 · 250 · 500 · 1000 ·
2000 mg/L glucose
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: yellow → blue-green

QUANTOFIX® Glutaraldehyde

REF 913 43

This test strip is for the fast and reliable determination of glutaraldehyde in solutions. The easy Dip & Read procedure provides reliable results in 20 seconds.

Glutaraldehyde is a strong disinfectant. It is, for example, often used in healthcare and medical engineering to disinfect surgical instruments and equipment. QUANTOFIX® Glutaraldehyde allows to check whether the glutaraldehyde concentration is sufficient for proper disinfection. Thus, a safe disinfection is ensured.

Type: test strips
Range: 0 · 0.5 · 1 · 1.5 · 2 · 2.5 %
glutaraldehyde
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: bright orange → magenta

QUANTOFIX® Total iron 1000 **NEW!**

REF 913 30

Without additional reagents – easy Dip & Read procedure

This test is designed for easily determining total iron in solutions. The easy Dip & Read procedure provides reliable results within 20 seconds.

In various industries, iron is used for pipes and containers. Iron determination is an important corrosion indicator. In drinking water, iron is not desirable, as it leads to unpleasant odors and brownish discolorations.

Type: test strips
Range: 0 · 5 · 20 · 50 · 100 · 250 · 500 ·
1000 mg/L Fe²⁺/Fe³⁺
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → dark red

QUANTOFIX® Total iron 100 **NEW!**

REF 913 44

Without additional reagents – easy Dip & Read procedure

Similar to QUANTOFIX® Total iron 1000, but with higher sensitivity and a reaction time of 60 seconds.

Type: test strips
Range: 0 · 2 · 5 · 10 · 25 · 50 · 100 mg/L Fe²⁺/Fe³⁺
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → blue-purple



Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® LubriCheck

REF 913 36

Using this test strip the concentration of cooling lubricants can quickly be determined. The easy Dip & Read procedure provides a reliable result within 1 minute.

Cooling lubricants are used when metal parts are being machined (drilling, cutting...). Using QUANTOFIX® LubriCheck the concentration of the cooling lubricant can easily be checked on the spot. This ensures optimal cooling and lubrication and at the same time optimal quality of the work piece. The measurement with QUANTOFIX® LubriCheck is rapid and reliable and can easily be performed by chemically untrained persons. Other methods used so far either require sensitive instruments (measurement of the refraction index) or have to be performed in the laboratory (determination after digestion).

The concentration is detected and given as mmol/L KOH. Using a factor the result can easily be transferred to the concentration of the cooling lubricant.

Type: test strips
 Range: 0 · 15 · 50 · 75 · 130 · 200 mmol/L KOH
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: yellow → blue

QUANTOFIX® Molybdenum

REF 913 25

This test allows the quick and easy determination of molybdenum in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 1 minute.

Molybdenum tests are mainly used for coolant water and boiler feed water. Here, molybdenum salts act as corrosion inhibitors, either directly or as part of an anticorrosive additive. The careful control of the molybdenum level is important to ensure optimal corrosion prevention. Also, the level of the anticorrosive additive can be easily controlled.

Type: test strips and reagents
 Range: 0 · 5 · 20 · 50 · 100 · 250 mg/L Mo⁶⁺
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → green

QUANTOFIX® Nickel

REF 913 05

This test strip is for the fast and reliable determination of nickel in solutions. The easy Dip & Read procedure provides a reliable result within 30 seconds.

Nickel is used in metal plating processes and for metal alloys. Metal parts that come into contact with skin are tested with QUANTOFIX® Nickel to prevent allergic reactions. The test is also used for the easy monitoring of electroplating solutions and industrial waste water.

Type: test strips
 Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L Ni²⁺
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → bright red

QUANTOFIX® Nitrate/Nitrite

REF 913 13

This test strip is for the fast and reliable determination of nitrate and nitrite in solutions. The easy Dip & Read procedure provides a reliable result within 1 minute.

Nitrite is an undesired byproduct in cooling lubricants. It allows the formation of carcinogenic compounds. Cooling lubricants are therefore regularly tested for nitrite.

In natural and drinking water nitrite can lead to infant mortality and kill aquatic life. The EPA primary drinking water standard is 1 mg/L.

Nitrate is a byproduct of biological decay from plant and animal matter. High concentrations can be found in rural, farming areas where fertilizers are regularly used. Also, industrial effluents may contain nitrate in higher levels. The EU threshold value is 50 mg/L and can safely controlled with QUANTOFIX® Nitrate/Nitrite. Farmers use this test to control the nitrogen content in soil to estimate the amount of fertilizer needed. In ponds and aquariums nitrate is often tested instead of ammonium to control the water quality.

Type: test strips
 Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 mg/L NO₃⁻
 0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO₂⁻
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → red-violet



QUANTOFIX® Nitrite

REF 913 11

Similar to QUANTOFIX® Nitrate/Nitrite but only the nitrite test.

Type: test strips
 Range: 0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO₂⁻
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years production
 Color change: white → red-violet

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Nitrite 3000

REF 913 22

Similar to QUANTOFIX® Nitrate/Nitrite but only the nitrite test and different range.

Type: test strips
Range: 0 · 0.1 · 0.3 · 0.6 · 1 · 2 · 3 g/L NO₂⁻
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: yellow → red

QUANTOFIX® Nitrite/pH

REF 913 38

This test allows the quick and easy determination of nitrite and pH in cooling lubricants. The easy Dip & Read procedure provides a reliable result within 1 minute.

When metal parts are machined (drilling, cutting, ...) cooling lubricants or coolants are indispensable to guarantee the quality of the work piece as well as the lifetime of the machines.

QUANTOFIX® Nitrite/pH is for the rapid and reliable control of two important parameters in cooling lubricants.

The Nitrite test is an indicator for bacterial growth in the cooling lubricant cycle. It allows early counteractive measures and therefore increases the lifetime of the cooling lubricant. Thus, significant cost savings are possible.

A weekly determination of the nitrite concentration is also recommended to protect workers from carcinogenic nitrosamine. High levels of nitrite in the cooling lubricant foster the formation of this carcinogenic compound.

The pH test is specially optimized for the demands of cooling lubricant analysis. Short testing cycles allow an early detection of pH changes. Counteractive measures can be performed to keep the pH at the optimal level. This ensures optimal protection against corrosion, inhibits bacterial growth and therefore reduces maintenance costs.

Type: test strips
Range: 0 · 1 · 5 · 10 · 20 · 40 · 80 mg/L NO₂⁻
pH 6.0 · 6.4 · 6.7 · 7.0 · 7.3 · 7.6 · 7.9 · 8.2 · 8.4 · 8.6 · 8.8 · 9.0 · 9.3 · 9.6
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → red-violet (NO₂⁻)
yellow/orange → violet/red (pH)

QUANTOFIX® Peracetic acid 50

REF 913 40

This test strip is for the fast and reliable determination of peracetic acid in solutions. The easy Dip & Read procedure provides safe results within 30 seconds.

Peracetic acid is a popular and widely used disinfectant. It is, for example, frequently used to disinfect packages in the beverage industry. After disinfection, packages are rinsed to wash out any remaining disinfectant. QUANTOFIX® Peracetic acid can check quickly and easily, if the disinfectant has been removed completely.

QUANTOFIX® Peracetic acid is specific to peracetic acid and does not, when adhering to the testing procedures, yield results for hydrogen peroxide.

Type: test strips
Range: 5 · 10 · 20 · 30 · 50 mg/L peracetic acid
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → blue



QUANTOFIX® Peracetic acid 500

REF 913 41

Similar to QUANTOFIX® Peracetic acid 50 but different range.

Type: test strips
Range: 0 · 50 · 100 · 200 · 300 · 400 · 500 mg/L peracetic acid
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: yellow → green

QUANTOFIX® Peracetic acid 2000

REF 913 42

Similar to QUANTOFIX® Peracetic acid 50 but different range.

Type: test strips
Range: 0 · 500 · 1000 · 1500 · 2000 mg/L peracetic acid
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: bright yellow → red



Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® Peroxide 25

REF 913 19

This test strip is for the fast and reliable determination of peroxide in solutions. The easy Dip & Read procedure provides a reliable result within 15 seconds.

Hydrogen peroxide (H₂O₂) is one of the most powerful oxidizers known. Its disinfectant capabilities are higher than for chlorine (Cl₂) or chlorine dioxide (ClO₂). It is extensively used in the food and dairy industries. Here, peroxide tests are used to ensure that residual peroxide sanitizer has been fully purged from packages prior to the filling. This guarantees that the product has the optimal quality and is free from peroxide.

In chemical laboratories QUANTOFIX® Peroxide 100 is used to check organic solvents, because peroxide containing solvents may explode when heated. Moisten the test pad with the solvent and allow it to dry. After drying, add a drop of distilled water to the test pad. If the test pad remains white the solvent is free of peroxides and can safely be used.

Type: test strips
 Range: 0 · 0.5 · 2 · 5 · 10 · 25 mg/L H₂O₂
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → blue



QUANTOFIX® Peroxide 100

REF 913 12

Similar to QUANTOFIX® Peroxide 25 but different range.

Type: test strips
 Range: 0 · 1 · 3 · 10 · 30 · 100 mg/L H₂O₂
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → blue

QUANTOFIX® Peroxide 1000

REF 913 33

Similar to QUANTOFIX® Peroxide 25 but different range.

Type: test strips
 Range: 0 · 50 · 150 · 300 · 500 · 800 · 1000 mg/L H₂O₂
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → brown

QUANTOFIX® Phosphate

REF 913 20

This test allows the quick and easy determination of phosphate in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 2 minutes.

In surface water, the presence of high phosphate concentrations may indicate domestic waste discharge, fertilizer runoff or the presence of industrial effluents or detergents. The phosphate content of surface water has direct consequences for its ability to support growth of certain organisms. Very high phosphate intake may lead to an eutrophication of rivers and lakes leading finally to the death of aquatic life.

In the maintaining of cooling or heating systems QUANTOFIX® Phosphate is used for the rapid and reliable control of corrosion inhibitors

Type: test strips and reagents
 Range: 0 · 3 · 10 · 25 · 50 · 100 mg/L PO₄³⁻ (only ortho phosphate)
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: white → blue-green



QUANTOFIX® Potassium

REF 913 16

This test allows the quick and easy determination of potassium in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 1 minute.

The natural potassium content in ground water is generally about 1–2 mg/L K. Higher values may indicate fecal contaminations, but can also originate from potassium fertilizers. For the growth of plants and animals potassium is an essential factor. Especially in agriculture the determination of potassium therefore gains increasing importance.

Type: test strips and reagents
 Range: 0 · 200 · 400 · 700 · 1000 · 1500 mg/L K⁺
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: yellow → orange

Test strips for semi-quantitative determinations

Description of individual parameters and tests

QUANTOFIX® QUAT

REF 913 37

This test strip is for the fast and reliable determination of quaternary ammonium compounds (QUAT) in solutions. The easy Dip & Read procedure provides a reliable result within 15 seconds.

Quaternary ammonium compounds are frequently used for the disinfection of medical devices, surfaces and closed cooling cycles. Using QUANTOFIX® QUAT, it can easily be controlled if the concentration of the disinfectant is sufficient. This ensures an optimal disinfection.

The test is calibrated for benzalkonium chloride. The packing insert contains conversion factors for many other quaternary ammonium compounds.

Test papers for quaternary ammonium compounds: see also INDQUAT (see page 34)

Type: test strips
Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L benzalkonium chloride
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: yellow → blue-green

QUANTOFIX® Sulfate

REF 913 29

This test strip is for the fast and reliable determination of sulfate in solutions. The easy Dip & Read procedure provides a reliable result within 2 minutes.

Sulfate is regularly found in natural waters. In cooling water and ion exchange systems sulfate must be monitored to prevent the formation of calcium sulfate (gypsum). The sulfate determination is also of importance to evaluate the aggressiveness of water towards concrete. In the beverage industry it is tested because of its effect on odor and taste.

Type: test strips
Range: < 200 · > 400 · > 800 · > 1200 · > 1600 mg/L SO₄²⁻
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: red → yellow

QUANTOFIX® Sulfite

REF 913 06

This test strip is for the fast and reliable determination of sulfite in solutions. The easy Dip & Read procedure provides a reliable result within 20 seconds.

In process and boiler water, sulfite is used as an oxygen scavenger. To avoid overdosage, the concentration needs to be controlled regularly. These tests are also used to control the sulfite concentration in foodstuff treated with sulphur compounds (SO₂, HSO₃⁻, SO₃²⁻) for longer shelf-life. In the process of wine making the control of sulfite is important to monitor production and quality of the wine.

Type: test strips
Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 · 1000 mg/L SO₃²⁻
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → salmon

QUANTOFIX® Tin

REF 913 09

This test strip is for the fast and reliable determination of tin in solutions. The easy Dip & Read procedure provides a reliable result within 5 seconds.

In the beverage industry QUANTOFIX® Tin is used to control canned juices or food. Depending on the storage conditions and the quality of the tin plating, significant quantities of tin may get into the product, causing a negative aftertaste. The control of tin ensures the optimal quality of the food.

Type: test strips
Range: 0 · 10 · 25 · 50 · 100 · 250 · 500 mg/L Sn²⁺
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: white → dark blue

QUANTOFIX® Zinc

REF 913 10

This test allows the quick and easy determination of zinc in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 2 minutes.

Zinc provides an effective protective coating for steel (galvanized coatings) and is useful as an alloying agent. QUANTOFIX® Zinc is used to regularly check the plating baths in metal plating industry. Zinc salts are useful as corrosion inhibitors in cooling water treatment formulations. Here, the zinc concentration is monitored to ensure an optimal process.

Type: test strips and reagents
Range: 0 · 2 · 5 · 10 · 25 · 50 · 100 mg/L Zn²⁺
Sufficient for: 100 tests
Shelf life: at least 2.5 years after production
Color change: orange → red

QUANTOFIX® Multi stick for aquarium owners

REF 913 26/913 27

This test strip is for the fast and reliable determination of the water quality in aquariums. Within 60 seconds the easy Dip & Read procedure provides important information on the total alkalinity (carbonate hardness), total hardness and pH. The water quality can be improved at an early stage ensuring a good health of fish.

Type: test strips
Range: 0 · 6.3 · 12.5 · 18.8 · 25.0 · 31.3 °e (total hardness)
0 · 3.8 · 7.5 · 12.5 · 18.8 · 25.0 °e (carbonate hardness)
pH 6.4 · 6.8 · 7.2 · 7.6 · 8.0 · 8.4
Sufficient for: 100 (REF 913 26) or 25 tests (REF 913 27)
Shelf life: at least 2.5 years after production
Color change: green → red (total hardness)
bright green → blue (carbonate hardness)
yellow → red (pH)

Test strips for semi-quantitative determinations

Automated reader for test strips

NEW!

QUANTOFIX® Relax

Optimized strip reading

The QUANTOFIX® Relax is a revolutionary step in test strip analysis. With this new system, MACHEREY-NAGEL offers an entirely objective way to read QUANTOFIX® test strips, making the system particularly suitable if results are critical to your decision making. The system simplifies testing procedures and the decision processes by eliminating the subjectivity of visual readings and by providing higher accuracy. Especially if you test large numbers of strips, the QUANTOFIX® Relax helps and supports you with easy result administration and quick testing procedures. Additionally, the QUANTOFIX® Relax allows you to get actual quantitative results – no gradation and estimation of in-between values is necessary.

The QUANTOFIX® Relax can change the way you work and test. The system enables you to focus on your core processes and is the perfect tool for your testing procedures.

Highest precision

- Quantitative results across the complete measuring range
- Higher accuracy and no in-between value guesswork
- Assure your decision making

Objective readings

- No influence of external light or human color perception
- Reproducible results independent of the operator
- Increase safety and comfort

Easy result administration

- Immediate print outs
- Data can be transferred to a computer
- Save time to focus on your core business

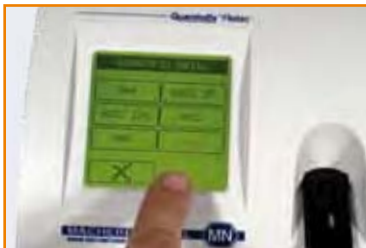
Optimized usability

Auto start



Place the strip on the instrument, the measurement starts automatically. So, operating is clean and easy.

Easily change tests



Select five different tests as your favorites out of a large variety of tests programmed into the instrument. With just two dials on the screen you can quickly change between your favorite tests.



Optimized result administration

Interface options



The instrument features an USB as well as an RS232 interface. It can easily be connected to existing laboratory information systems and also to PCs.

Printer



The result is printed using a fast and silent internal printer. Thus, you can easily staple the results to production files for later check or QC procedures.

Memory for 200 measurements



Up to 200 measurements can be stored. Using internal functions, positive readings are easily filtered out, enabling further diagnosis whenever necessary.

Test strips for semi-quantitative determinations

Automated reader for test strips

Technical data

Instrument memory	200 test results including sample ID
Interface	User: touch screen, alphanumeric input, password protection Computer: USB and RS232 interface for connection to PC, PS/2 interface for connection of keyboard and / or barcode scanner
Dimensions / Weight	Depth: 20 cm (7.9 inches) / Width: 16 cm (6.3 inches) / Height: 7.5 cm (3.0 inches) Weight: 710 g (1.90 lb), (w/o batteries and power supply)
Power requirements	110–240 V AC, automatic Battery powered operation (optional) with 6 AA batteries
Operation	Temperature range: 5–40 °C (41–104 °F) Humidity range: 20–80 % relative humidity, non condensing Calibration: automatic, self calibrating
Capacity	50 strips per hour

Ordering information

Test	Range	REF
Spare parts and accessories		
Reflectometer QUANTOFIX® Relax, suitable for evaluation of QUANTOFIX® test strips incl. power supply, adapter, manual and 1 roll of printer paper		913 46
Case for reflectometer QUANTOFIX® Relax, for individual combination with QUANTOFIX® Relax, 3 rolls of printer paper, 6 QUANTOFIX® tubes, 6 batteries, power supply and accessories		930 889
Printer paper for QUANTOFIX® Relax		930 65
Barcode scanner for QUANTOFIX® Relax		930 74
Tests calibrated on the instrument that can be run with the instrument software		
QUANTOFIX® Ammonium*	10–400 mg/L NH ₄ ⁺	913 15
QUANTOFIX® Ascorbic acid	50–2000 mg/L vitamin C	913 14
QUANTOFIX® Glucose	50–2000 mg/L Glucose	913 48
QUANTOFIX® Nitrate/Nitrite	10–500 mg/L NO ₃ ⁻ / 1–80 mg/L NO ₂ ⁻	913 13
QUANTOFIX® Nitrite	1–80 mg/L NO ₂ ⁻	913 11
QUANTOFIX® Peracetic acid 50	5–50 mg/L peracetic acid	913 40
QUANTOFIX® Peracetic acid 500	50–500 mg/L peracetic acid	913 41
QUANTOFIX® Peracetic acid 2000	500–2000 mg/L peracetic acid	913 42
QUANTOFIX® Peroxide 25	0.5–25 mg/L H ₂ O ₂	913 19
QUANTOFIX® Peroxide 100	1–100 mg/L H ₂ O ₂	913 12
QUANTOFIX® Peroxide 1000	50–1000 mg/L H ₂ O ₂	913 33
QUANTOFIX® Sulfate	< 200 – > 1600 mg/L SO ₄ ²⁻	913 29
pH-Fix 6.0–10.0	pH 6.0–10.0	921 22

Additional tests will be added to the instrument successively based on customer demand. If you are interested in a specific test for the QUANTOFIX® Relax, please contact your local distributor or MACHEREY-NAGEL directly.



Test strips for semi-quantitative determinations

Description of individual parameters and tests

Special test strips and test papers

The tests in this special selection are designed to test special analytical questions and provide solutions for specific requirements. Most strips feature high quality color scales for semi-quantitative determinations, while some are just quantitative in nature.

Similar to all our other test strips and papers, the tests mentioned above are very easy to use, especially user friendly and they provide results within seconds.



Table of applications

Determination of	Test paper/ test strips	Gradation	REF
Ammonium / Ammonia	Ammonia Test	0 · 0.5 · 1 · 3 · 6 mg/L NH ₄ ⁺	907 14
Chlorine	Chlorine Test	10 · 50 · 100 · 200 mg/L Cl ₂	907 09
Fluoride ions	Fluoride Test	0 · 2 · 5 · 10 · 20 · 50 · 100 mg/L F ⁻	907 34
Halide ions	Saltesmo	0 · 0.25 · 0.5 · 1 · 2 · 3 · 4 · 5 g/L NaCl	906 08
Humidity in air (relative)	Moisture indicator*	20 · 30 · 40 · 50 · 60 · 70 · 80 %	908 01
	Moisture indicator*	8 %	908 901
	Moisture indicator without cobalt chloride	8 %	908 903
Ozone content in air	Ozone Test	< 90 · 90–150 · 150–210 · > 210 µg/m ³ O ₃	907 36
QUATS	INDQUAT	on request	909 000 – 909 002
Silver	Ag-Fix (test paper)*	0 · 1 · 2 · 3 · 5 · 7 · 10 g/L Ag ⁺	907 40
	Ag-Fix (test strips)	0 · 0.5 · 1 · 2 · 3 · 5 · 7 · 10 g/L Ag ⁺ pH 4 · 5 · 6 · 7 · 8	907 41
Swimming pool parameters	Cyanuric Acid Test	see page 36	907 10
	Swimming Pool Test 3 in 1	see page 36	907 52
	Swimming Pool Test 5 in 1	see page 36	907 59
Water hardness	AQUADUR®	see page 33	

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Ammonia Test

REF 907 14

This test strip is for the fast and reliable determination of ammonium, respectively ammonia, in solutions. The easy Dip & Read procedure provides safe results within 40 seconds.

Ammonium/ammonia is harmful to fish and other aquatic life in aquariums. This test shows the amount of ammonium quickly and easily. Thus, the aquarium can be kept in good condition and fish stay healthy.

Type: test strips
 Range: 0 · 0.5 · 1 · 3 · 6 mg/L NH₄⁺
 Sufficient for: 25 tests
 Shelf life: at least 2.5 years after production
 Color change: bright yellow → blue

Ag-Fix (test strips)

REF 907 41

This test strip is for the fast and reliable determination of silver in fixing baths. The easy Dip & Read procedure provides a reliable result within 30 seconds.

Fixing is the final step in the development of photos and films. Excess silver halides are washed from the photographic layer. To ensure proper operation of the bath, the silver content as well as the pH have to be checked regularly.

Type: test strips
 Range: 0 · 0.5 · 1 · 2 · 3 · 5 · 7 · 10 g/L Ag⁺
 pH: 4 · 5 · 6 · 7 · 8
 Sufficient for: 100 tests
 Shelf life: at least 2.5 years after production
 Color change: yellow → brown (silver)
 yellow → blue (pH)

Ag-Fix (test paper)

REF 907 40

Similar to Ag-Fix test strips but without test pad for pH

Type: test paper
 Range: 0 · 1 · 2 · 3 · 5 · 7 · 10 g/L Ag⁺
 Presentation: Reel of 5 m length
 Shelf life: at least 2 years after production
 Color change: yellow → brown

Test strips for semi-quantitative determinations

Description of individual parameters and tests

AQUADUR®

AQUADUR® are test strips for the determination of water hardness. Clear color changes from green to red ensure an accurate readout. Individually sealed AQUADUR® test strips can perfectly be combined with promotion activities to inform customers about the necessity of water softeners. Instructions for use are printed on the seal. Due to the clear design with green / red indication, the result can be read without color chart.

The hardness of water depends on its content of calcium and magnesium salts. The total sum of these salts determines the hardness of water. In the USA, it is expressed in terms of ppm (mg/L) CaCO₃.

Water is often simply classified as "soft water", or "hard water" etc. The following values generally apply to these terms:

below 50 ppm CaCO₃ – very soft water

50–120 ppm CaCO₃ – soft water

120–240 ppm CaCO₃ – medium hard water

240–360 ppm CaCO₃ – hard water

above 360 ppm CaCO₃ – very hard water

AQUADUR® Sensitive

REF 912 10

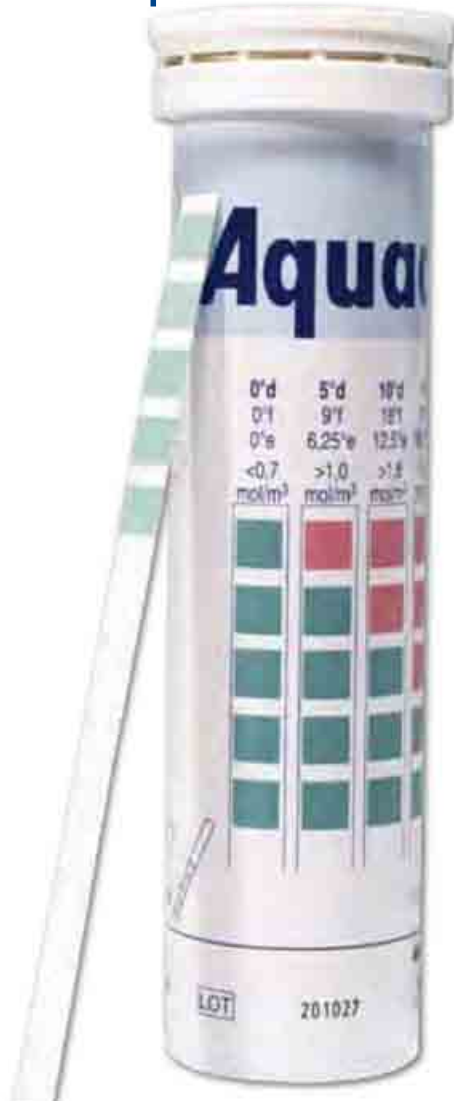
This test allows the rapid and reliable detection of very low water hardness. The easy Dip & Read procedure provides a reliable result within 20 seconds.

In dialysis centres AQUADUR® Sensitive is used to check feed water. Low levels of water hardness are necessary to ensure optimal function of further water purification such as reversed osmosis.

This test is CE-marked according to the directive for medical products 93/42/EWG for use in dialysis.

Ordering information

Gradation	Color change	Presentation	REF
< 54 · > 90 · > 180 · > 270 · > 360 · > 450 ppm CaCO ₃	green → red	Box of 100 test strips 6 x 95 mm	912 01
< 54 · > 72 · > 126 · > 252 · > 378 ppm CaCO ₃	green → red	Box of 100 test strips 6 x 95 mm	912 20
< 54 · > 72 · > 151.2 · > 252 ppm CaCO ₃	green → red	Box of 100 test strips 6 x 95 mm	912 39
< 54 · > 90 · > 180 · > 270 · > 360 · > 450 ppm CaCO ₃	green → red	1000 individually sealed test strips, outer dimensions 22 x 95 mm	912 23
< 54 · > 72 · > 126 · > 252 · > 378 ppm CaCO ₃	green → red	1000 individually sealed test strips, outer dimensions 22 x 95 mm	912 24
< 54 · > 72 · > 151.2 · > 252 · > 378 ppm CaCO ₃	green → red	1000 individually sealed test strips, outer dimensions 22 x 95 mm	912 40
< 54 · > 90 · > 180 · > 270 · > 360 · > 450 ppm CaCO ₃	green → red	5000 test strips, without scale	912 21
< 54 · > 72 · > 126 · > 252 · > 378 ppm CaCO ₃	green → red	5000 test strips, without scale	912 22
< 54 · > 90 · > 180 · > 270 · > 360 · > 450 ppm CaCO ₃	green → red	Set of 3 individually sealed test strips, pack of 50 sets	912 902
AQUADUR® Sensitive			
0 · 5.4 · 10.8 · 19.8 ppm CaCO ₃ CE	light beige → blue	Box of 100 test strips 6 x 95 mm	912 10
CE : CE-marked according to the directive for medical products 93/42/EWG			



Test strips for semi-quantitative determinations

Description of individual parameters and tests

Chlorine Test

REF 907 09

This test paper allows the quick and easy determination of chlorine in solutions. The easy Dip & Read procedure provides a reliable result within a few seconds.

Chlorine is widely used for disinfection. Dosed correctly, harmful microorganisms are safely destroyed, many impurities removed and the growth of algae is prevented. Chlorine Test is used to monitor the concentration of disinfection baths.

Type: test paper
 Range: 10 · 50 · 100 · 200 mg/L Cl₂
 Presentation: reel of 5 m length
 Shelf life: at least 2 years after production
 Color change: white → dark blue



Fluoride Test

REF 907 34

This test paper is for the quick and easy determination of fluoride in solutions. It includes all necessary reagents so that the measurement can be started immediately. A reliable result is obtained within 2 minutes.

The test can also be used for the detection of dangerous hydrofluoric acid that is used in the production of computer chips.

Type: test paper with reagents
 Range: 0 · 2 · 5 · 10 · 20 · 50 · 100 mg/L F⁻
 Sufficient for: 30 tests
 Shelf life: at least 2 years after production
 Color change: red → white

INDIQUAT

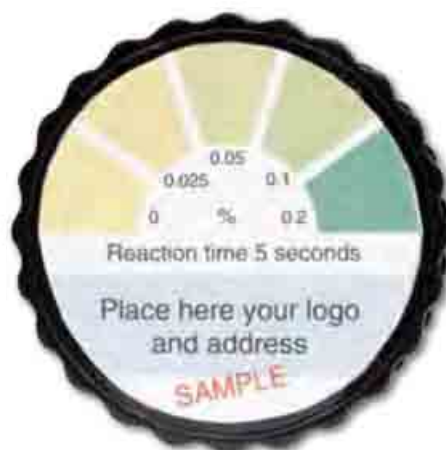
REF 909 000–909 002

This test paper allows the quick and easy determination of QUAT-based disinfectants in solutions. The easy Dip & Read procedure provides a reliable result within 10 seconds.

Quaternary ammonium compounds (QUAT) identifies a group of chemicals that are used for the disinfection of medical devices and surfaces. They are usually supplied as concentrates that have to be diluted prior to use. The concentration of these dilutions can easily be controlled with INDIQUAT.

INDIQUAT is only manufactured in customer presentation and on request. Alternatively, QUANTOFIX® QUAT (see page 29) can be used for the rapid and reliable detection of quaternary ammonium compounds.

Type: test paper
 Range: on request
 Presentation: reel of 5 m length
 Shelf life: at least 2 years after production



Moisture indicator

REF 908 01

This test is used for the quick and easy determination of the relative atmospheric humidity. The paper is simply exposed to the atmosphere in question. When the color of the pad does not change anymore, the humidity can be read off.

Moisture sensitive goods e.g. electronics and optical systems have to be stored at low atmospheric humidity. They are usually packed in sealed plastic bags together with a desiccant.

Moisture indicators are used to control if the desiccants is active and if moisture is effectively kept away from the goods.

Type: self-adhesive label
 Range: 20 · 30 · 40 · 50 · 60 · 70 · 80 % r.H.
 Presentation: box of 12 adhesive labels
 Color change: pink ↔ blue

Moisture indicator

REF 908 901

Similar to 908 01 but only for 8 % r.H.

Type: test paper
 Sensitivity: 8 % r.H.
 Presentation: pack of 1000 indicators, 60 x 35 mm
 Color change: pink ↔ blue

Test strips for semi-quantitative determinations

Description of individual parameters and tests

Non-toxic moisture indicator without cobalt chloride REF 908 903

This test is similar to 908 901 with one important difference:
The patented moisture indicator is free from carcinogenic and toxic material. The clear color change from red to yellow ensures precise readings.

Established humidity indicators are based on cobalt chloride (CoCl_2), which has been found to be carcinogenic and toxic. Contact to these types of indicators represents a health and safety risk to staff involved in handling and packing.

The patented non-toxic moisture indicator eliminates these risks and increase safety.

Type: test paper
Sensitivity: 8 % r.H.
Presentation: pack of 1000 indicators, 60 x 35 mm
Color change: yellow ↔ red

Ozone Test REF 907 36

This test is used for the quick and easy determination of ozone in air. The test strip is placed in the open air at a wind-shielded location. A reliable result is obtained within 10 minutes.

Ozone is a toxic gas that is formed on sunny days from oxygen and nitrogen oxides. It causes headache, cough and other irritations of the respiratory tract. It is often recommended, that sensitive persons stop physical activities (i.e. jogging) at concentrations $>180 \mu\text{g}/\text{m}^3$.

The ozone concentration varies locally. Using Ozone Test the concentration can be measured directly at the point of interest.

Type: test strips
Range: $< 90 \cdot 90-150 \cdot 150-210 \cdot > 210 \mu\text{g}/\text{m}^3$
ozone
Sufficient for: 12 tests
Shelf life: at least 1.5 years after production
Color change: white → brown

Saltesmo REF 906 08

This test paper allows the quick and easy determination of chloride, bromide and iodide in solutions. The test disc is simply punched with an enclosed needle and put into the sample. A reliable result is obtained within 2 minutes.

Sodium chloride is common table salt (NaCl). Saltesmo is used for the detection of salt water in ships and for salt determination in foodstuffs.

Type: test discs
Range: $0 \cdot 0.25 \cdot 0.5 \cdot 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \text{ g/L NaCl}$
Sufficient for: 30 tests
Shelf life: at least 1.5 years after production
Color change: red → yellow



Test strips for semi-quantitative determinations

Description of individual parameters and tests

Swimming Pool Test 5 in 1

REF 907 59

This test allows the quick and easy determination of the water quality in swimming pools. The test strip is dipped into the pool and moved back and forth 5 times. A reliable result is obtained within 30 seconds.

The test provides valuable results about the water hardness, the total alkalinity, free and total chlorine and pH. Monitoring of the water quality allows adjusting the dosage of water conditioners in good time. The pool remains nice and clean.

Type: test strips
 Range: 0 · 100 · 250 · 500 · 1000 mg/L CaCO₃ (total hardness)
 0 · 0.5 · 1 · 3 · 5 · 10 mg/L Cl₂ (free chlorine)
 0 · 1 · 3 · 5 · 10 mg/L Cl₂ (total chlorine)
 0 · 80 · 120 · 180 · 240 mg/L CaCO₃ (alkalinity)
 pH 6.4 · 6.8 · 7.2 · 7.6 · 8.4
 Sufficient for: 50 tests
 Shelf life: at least 2 years after production
 Color change: blue → red (total hardness)
 yellow → violet (total chlorine)
 yellow → violet (free chlorine)
 light green → dark green (alkalinity)
 yellow → red (pH value)

Swimming Pool Test 3 in 1

REF 907 52

Similar to Swimming Pool test 5 in 1 but only with test pads for alkalinity, free chlorine and pH.

Cyanuric Acid Test

REF 907 10

This test strip is for the fast and reliable determination of cyanuric acid in swimming pools. The test strip is simply dipped into the water and moved back and forth five times. After 30 seconds safe results can be read by simply comparing the strip with the color chart.

Strong sun shine (UV radiation) on swimming pool water decomposes chlorine very quickly. Cyanuric acid stabilizes chlorine in swimming pool water, inhibits decomposition and thus ensures the water's safe and proper disinfection.

Type: test strips
 Range: 0 · 50 · 100 · 150 · 300 mg/L cyanuric acid
 Sufficient for: 25 tests
 Shelf life: at least 2.5 years after production
 Color change: orange → red



Test papers for qualitative determinations

Description of individual parameters and tests

Qualitative test papers

Test papers allow the qualitative determination of ions and chemical compounds.

They are used to detect if compounds tested for are present above the specific detection limit. Some of the papers have specific applications.



Test papers

Table of applications

Determination of	Test paper/Test strips	Presentation	REF
Alkaline phosphatase in milk	Phosphatesmo MI	box of 50 test strips 10 x 95 mm	906 12
Aluminum ions (Al ³⁺)	Aluminum test paper	box of 100 strips 20 x 70 mm	907 21
Ammonia, ammonium ions (NH ₃ , NH ₄ ⁺)	Ammonium test paper	box of 200 strips 20 x 70 mm	907 22
Antimony ions (Sb ³⁺)	Antimony test paper	box of 200 strips 20 x 70 mm	907 23
Arsenic, arsine (As, AsH ₃)	Arsenic test paper* = mercury bromide paper	box of 200 strips 20 x 70 mm	907 62
Bismuth ions (Bi ³⁺)	Bismuth test paper	box of 200 strips 20 x 70 mm	907 33
Blood traces (Peroxidase)	Peroxtesmo KM	box of 25 sheets 15 x 30 mm	906 05
Boric acid, borates (H ₃ BO ₃ , BO ₃ ³⁻)	Tumeric paper	box of 200 strips 20 x 70 mm	907 47
Chlorine, free halogens	Chlortesmo Potassium iodide starch paper (see below)	box of 200 strips 20 x 70 mm	906 03
Chromium, chromate (Cr(VI), CrO ₄ ²⁻)	Chromium test paper	box of 200 strips 20 x 70 mm	907 24
Cobalt ions (Co ²⁺)	Cobalt test paper	box of 100 strips 20 x 70 mm	907 28
Copper, copper ions (Cu, Cu ⁺ , Cu ²⁺)	Cuprotesmo	box of 40 sheets 40 x 25 mm	906 01
Copper(II) ions (Cu ²⁺)	Copper test paper	box of 200 strips 20 x 70 mm	907 29
Cyanide, hydrocyanic acid (CN ⁻ , HCN)	Cyantesmo*	reel of 5 m length	906 04
Fluorides, hydrogen fluorides (F ⁻ , H ₂ F ₂)	Fluoride test paper	box of 200 strips 20 x 70 mm	907 50
Halogens, especially free chlorine	Chlortesmo	box of 200 strips 20 x 70 mm	906 03
Hydrogen sulfide (H ₂ S), sulfide ions (S ₂ ⁻)	Lead acetate paper*	roll of 5 m length refill pack of 3 rolls booklet with 100 strips 10 x 75 mm	907 44 907 45 907 46
	Sulfide test paper	roll of 5 m length	907 61
Iron(II) ions (Fe ²⁺)	Dipyridyl paper	box of 200 strips 20 x 70 mm	907 25
Iron ions (Fe ²⁺ , Fe ³⁺)	Iron test paper	box of 100 strips 20 x 70 mm	907 26
Lactoperoxidase in milk	Peroxtesmo MI	box of 100 strips 15 x 15 mm	906 27
Lead, lead ions (Pb, Pb ²⁺)	Plumbtesmo	box of 40 sheets 40 x 25 mm	906 02
Mastitis	Udder test paper	PE bag with 20 sheets	907 48
Nickel(II) ions (Ni ²⁺)	Nickel test paper	box of 200 strips 20 x 70 mm	907 30
Nitrate and nitrite (NO ₃ ⁻ , NO ₂ ⁻)	Nitratismo	reel of 5 m length	906 11
Nitrite ions (NO ₂ ⁻), nitrous acid (HNO ₂), ozone (O ₃)	Potassium iodide starch paper MN 816 N (normal sensitivity)	reel of 5 m length refill pack of 3 rolls booklet of 100 strips 10 x 75 mm	907 54 907 55 907 56
	Potassium iodide starch paper MN 616 T (for spot tests)	box of 200 strips 20 x 70 mm	907 58
Oil in water and soil	Oil test paper	box of 100 strips 20 x 70 mm	907 60
Peroxidase in foodstuffs	Peroxtesmo KO	box of 100 sheets 15 x 15 mm	906 06
Peroxidase in milk	Peroxtesmo MI	box of 100 sheets 15 x 15 mm	906 27
Potassium ions (K ⁺)	Potassium test paper	box of 200 sheets 20 x 70 mm	907 27
Protein residues	INDIPRO*	box of 60 test sticks 10 x 95 mm and reagents	907 65
Reducing agents, SO ₂ , sulfite ions	Potassium iodate starch paper	reel of 5 m length	907 53
Silver ions (Ag ⁺)	Silver test paper	box of 200 strips 20 x 70 mm	907 32
Sulphur dioxide (SO ₂), sulfite ions	Sulfite test paper	box of 100 strips 20 x 70 mm	907 63
Sperm, acid phosphatase	Phosphatesmo KM	box of 25 sheets 15 x 30 mm	906 07
Vat dyes, end-point of conversion	Indanthere yellow paper	box of 200 strips 20 x 70 mm	907 51
Water on the bottom of fuel tanks	AQUATEC test sticks	box of 100 strips 10 x 200 mm	907 42
Water in org. solutions	Watesmo	reel of 5 m length	906 09
Water distribution in butter	Wator	box of 50 sheets 78 x 40 mm	906 10
Zirconium ions (Zr ⁴⁺)	Zirconium test paper	box of 100 strips 20 x 70 mm	907 21

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Test papers for qualitative determinations

Description of individual parameters and tests

Aluminum test paper

REF 907 21

The test paper allows the quick and easy detection of aluminum. In the presence of aluminum (Al^{3+}) it shows bright red spots on a yellow background.

Using a different procedure, the test paper can be used for the determination of zirconium.

Type: test paper
 Limit of sensitivity: 10 mg/L Al^{3+}
 Sufficient for: 100 tests
 Color change: yellow → bright-red

Ammonium test paper

REF 907 22

The test paper can be used for the rapid detection of ammonium ions as well as for gaseous ammonia. The white paper turns brownish-yellow in the presence of ammonium ions or NH_3 . This test paper is specific for the determination of NH_4^+ .

Type: test paper
 Limit of sensitivity: 10 mg/L NH_4^+
 Sufficient for: 200 tests
 Color change: white → brownish-yellow

Antimony test paper

REF 907 23

The test paper allows the quick and easy detection of antimony [Sb(III)]. In the presence of antimony [Sb(III)] it shows orange-red spots on a yellow background. Pentavalent antimony, i.e. Sb(V), has to be reduced to Sb(III) with metallic magnesium.

This test paper is specific for antimony.

Type: test paper
 Limit of sensitivity: 5 mg/L Sb^{3+}
 Sufficient for: 200 tests
 Color change: yellow → orange-red

AQUATEC

REF 907 42

This test allows the quick and easy measurement of the water amount at the bottom of petrol and fuel oil tanks.

In petrol and fuel oil tanks water accumulates over time forming a layer at the bottom. To measure this layer the PE strip is fixed onto a flat steel sheet so that the lower ends coincide. It is then lowered into the tank with a tin cord until it reaches the bottom. Any water present beneath the fuel will dissolve the blue layer (testing time about 15–20 seconds). The thickness of the water layer corresponds to the colorless part of the strip.

Type: test strips
 Limit of sensitivity: depending on the geometry of the tank, about 1–2 mm water layer

Sufficient for: 100 tests
 Color change: blue → colorless

Arsenic test paper (Mercury(II)bromide paper)

REF 907 62

This test paper allows the easy detection of arsine (AsH_3) in the gas phase. Arsenic in solutions has to be converted into AsH_3 with Zn/acid and purged from the solution. The arsine is detected directly at the boundary layer between water and air.

Arsenic test paper is used for the easy determination of arsenic in grape must and wine. For the determination of arsine in compartment air the test paper is moistened with acetic anhydride.

Type: test paper
 Limit of sensitivity: 0.5 $\mu\text{g As}$
 Sufficient for: 200 tests
 Color change: white → brown-black

Bismuth test paper

REF 907 33

This test paper allows the quick detection of bismuth. In the presence of bismuth ions (Bi^{3+}) it shows an orange-red discoloration on a pale-yellow background.

Type: test paper
 Limit of sensitivity: 60 mg/L Bi^{3+} (Nitric acid > 3 % leads to reduced sensitivity)

Sufficient for: 200 tests
 Color change: pale-yellow → orange-red

Chlortesmo

REF 906 03

This test paper allows the quick and easy detection of free halogens (chlorine, bromine, iodine). Free nitrous acid HNO_2 (not nitrite ions) interferes, but can be destroyed by addition of amidosulfuric acid.

Type: test paper
 Limit of sensitivity: 1 mg/L Cl_2
 Sufficient for: 200 tests
 Color change: pale-yellow → blue



Test papers for qualitative determinations

Description of individual parameters and tests

Chromium test paper

REF 907 24

This test paper allows the quick and easy detection of chromate (CrO_4^{3-}). Cr(III) ions must be converted to chromate prior to the detection.

For non-destructive testing of materials apply a drop of acid solution (1 part hydrochloric acid 37% + 4 parts hydrogen peroxide 3%) to the degreased surface. After 10–30 seconds add a drop sodiumhydroxyde (NaOH). Press the test paper onto the precipitate then put it into diluted sulfuric acid. In the presence of chromium, a violet spot appears. With this procedure chromium contents > 0.1% are safely detected.

Type: test paper
Limit of sensitivity: 2 mg/L Cr^{3+} or 5 mg/L CrO_4^{2-}
Sufficient for: 200 tests
Color change: white → violet

Cobalt test paper

REF 907 28

This test paper allows the quick and easy detection of cobalt (Co^{2+}).

For non-destructive testing of materials apply a drop of acid solution (50 mL hydrogen peroxide 3% + 7.5 mL o-phosphoric acid 85% + 5 mL hydrochloric acid 37%) to the degreased surface. After 30–60 seconds absorb the liquid with the test paper. In the presence of cobalt a blue color appears. The intensity of the color varies according to the concentration. With this procedure cobalt contents > 0.5% are safely detected.

Type: test paper
Limit of sensitivity: 25 mg/L Co^{2+}
Sufficient for: 100 tests
Color change: white → blue

Copper test paper

REF 907 29

This test paper allows the quick and easy detection of copper. It is specific for Cu^{2+} .

Note: For the determination of copper on surfaces and in alloys, checking for pores in metallic coatings on copper, for criminal trace investigations (projectiles), and for the detection of copper-containing pesticides on plants, fruit or vegetables we recommend the specific and highly sensitive paper Cuprotesmo (REF 906 01, page 39) with a sensitivity of 0.05 μg .

Type: test paper
Limit of sensitivity: 20 mg/L Cu^{2+}
Sufficient for: 200 tests
Color change: white → green

Cuprotesmo

REF 906 01

This test paper allows the quick and easy detection of copper(I) and copper(II) ions. Is used for the detection of copper and copper salts on surfaces and in ash, for the detection of pores in metallic coatings on copper containing materials, in criminal trace investigations (bullets), and for the detection of copper-containing pesticides on fruit and vegetables. The test paper is specific for copper.

Type: test paper
Limit of sensitivity: 0.05 μg on surfaces,
3–5 mg/L Cu in solutions
Sufficient for: 40 tests
Color change: yellow-white → pink-purple

Cyantesmo

REF 906 04

This test paper allows the quick and easy detection of hydrocyanic acid and cyanides in aqueous solutions and extracts. They are for example formed in the manufacture of fruit brandies and are toxic even in low concentrations. To detect cyanides in solution, a drop of concentrated sulfuric acid is added to 10 mL sample. Hydrocyanic acid gas is formed and can be detected at the boundary layer between water and air.

Type: test paper
Limit of sensitivity: 0.2 mg/L hydrocyanic acid (HCN)
Presentation: reel of 5 m length
Color change: pale-green → blue



Dipyridyl paper

REF 907 25

The test paper allows the sensitive and specific detection of Fe(II) ions. Even small amounts of Fe(II) can safely be detected in the presence of large amounts of Fe(III).

Type: test paper
Limit of sensitivity: 2 mg/L Fe^{2+}
Sufficient for: 200 tests
Color change: white → red

Test papers for qualitative determinations

Description of individual parameters and tests

Fluoride test paper

REF 907 50

The test paper allows the fast detection of fluoride ions in solutions containing hydrochlorid acid. It is suitable for the safe and easy detection of dangerous hydrofluoric acid, which is used for example in computer chip production.

Type: test paper
 Limit of sensitivity: 20 mg/L F⁻
 Sufficient for: 200 tests
 Color change: pink → yellow-white



Indanthrene yellow paper

REF 907 51

The test paper allows the easy determination of hydrosulfite (sodium dithionite) in alkaline solution. It is used to determine the endpoint in the conversion of vat dyes to the leuco form. Because of the special purpose, indanthrene yellow paper is also called hydrosulfite paper.

Type: test paper
 Limit of sensitivity: alkaline sodium dithionite traces
 Sufficient for: 200 tests
 Color change: yellow ↔ blue



INDIPRO

REF 907 65

The test paper allows the detection of protein contamination on surfaces and tools coming in contact with food. The test kit consists of 60 test strips with reagents.

Type: test strips and reagents
 Limit of sensitivity: 50 µg BSA (bovine serum albumin)
 Sufficient for: 60 tests
 Color change: yellow → green

Iron test paper

REF 907 26

This test paper is used for the fast detection of iron ions (Fe²⁺ and Fe³⁺). In contrast to Dipyrindyl paper it reacts with Fe(II) as well as Fe(III) ions. For the specific detection of Fe(II) please use Dipyrindyl paper (REF 907 25, page 39).

Type: test paper
 Limit of sensitivity: 10 mg/L Fe²⁺ or Fe³⁺
 Sufficient for: 100 tests
 Color change: yellow-white → red-brown

Lead acetate paper

REF 907 44

The test paper allows the quick and easy detection of hydrogen sulfide. This gas occurs in the processing of raw oil. It is toxic even in low concentrations. Therefore, critical points are carefully checked. Sulfide containing solutions also give a positive reaction.

Lead acetate is toxic and the test paper needs to be declared as hazardous. The technically equivalent Sulfide test paper (REF 907 61, page 43) is a non-toxic and safe alternative.

Type: test paper
 Limit of sensitivity: 1 drop of a solution containing 5 mg/L sulfide (S²⁻) shows a positive reaction
 Presentation: reel of 5 m length
 Color change: white → brown-black

This test paper is also available as refill pack with 3 reels (REF 907 45) and as booklet with 100 strips (REF 907 46).

Mastitis

see Udder test paper, page 44

Mercury bromide paper

see Arsenic test paper, page 38

Nickel test paper

REF 907 30

This test paper allows the quick and easy detection of nickel. For non-destructive testing of materials apply a drop of 3% nitric acid (1 part nitric acid 85%, 5 parts water) to the degreased surface. After 1 minute absorb the liquid with the test paper. With this procedure nickel contents > 0.5% are safely detected.

Type: test paper
 Limit of sensitivity: 10 mg/L Ni²⁺
 Sufficient for: 200 tests
 Color change: white → red

Test papers for qualitative determinations

Description of individual parameters and tests

Nitratesmo

REF 906 11

This test paper allows the reliable detection of nitrate and nitrite. It shows different colors for the two ions.

Type: test paper
 Limit of sensitivity: 10 mg/L nitrate (NO₃⁻),
 5 mg/L nitrite (NO₂⁻)
 Presentation: reel of 5 m length
 Color change: Nitrate: white → red (dip test paper into sample and afterwards into sulphuric acid 96%)
 Nitrite: white → yellow (dip test paper into sample and afterwards into hydrochloric acid 5 mol/L)

Oil test paper

REF 907 60

This test paper allows the fast and reliable detection of oil contaminations of water and soil. The sensitivity largely depends on the nature of the respective hydrocarbon. For detection of oil in soil, press the paper firmly against the soil to be tested and rinse with clear water. To determine oil in water, move the paper back and forth a few times in the sample. In case of volatile hydrocarbons, the color reaction of the test paper has to be evaluated immediately.

Substance	Color change	
	lower limit mg/L of water	clearly detectable mg/L of water
Petroleum ether (b. p. 40–80 °C)	250	400
Gasoline (high octane)	10	25
Fuel oil	5	10
Lubricating oil	1	5

Type: test paper
 Limit of sensitivity: see table
 Sufficient for: 100 tests
 Color change: pale blue → dark blue

Peroxtesmo KM

REF 906 05

This test paper allows the fast and sensitive detection of blood traces. In criminal investigations it is used as a quick screening test.

The test paper uses the pseudo-peroxidatic effect of blood. The material in question is allowed to soak in water for about 1 minute. Then the test paper is pressed to the sample. Blood traces lead to a distinct discoloration within a few seconds. The test papers are individually sealed in plastic. This ensures safe results at any time.

Type: test paper
 Limit of sensitivity: blood traces
 Sufficient for: 25 tests
 Color change: white → blue

Peroxtesmo KO

REF 906 06

This test paper allows the quick and easy detection of peroxidase in food. It is used in the food processing industry to evaluate the quality of canned food.

A drop of the sample is put onto the test paper. Alternatively, the paper can be pressed to freshly cut surfaces. In the presence of peroxidase a blue color appears within 2 minutes.

Type: test papers
 Limit of sensitivity: peroxidase traces
 Sufficient for: 100 tests
 Color change: white → blue-green

Peroxtesmo MI

REF 906 27

This test paper allows the specific detection of lactoperoxidase in milk. In the dairy industry the test is used for the quick and easy quality control of ultra heat treated (UHT) milk. In contrast to the alternative guaiacol method, Peroxtesmo MI is odorless and non-toxic.

A drop of milk is put onto the test paper. If the paper remains white, the ultra heat treatment process is completed.

Type: test paper
 Limit of sensitivity: 3% raw milk in UHT milk
 Sufficient for: 100 tests
 Color change: white → blue



Test papers for qualitative determinations

Description of individual parameters and tests

Phosphatesmo KM

REF 906 07

The test paper allows the quick and easy detection of sperm. In criminal investigations it is used as a rapid screening test.

The paper is specific for acid phosphatase. The material in question is allowed to soak in physiological saline solution for about 1 minute. Then the material is placed on the paper. In presence of acid phosphatase the paper turns violet. The reaction is not a suitable substitute for the microscopic determination of live spermatozoa.

The test papers are individually sealed in plastic. This ensures clear results at any time.

Type: test papers
 Limit of sensitivity: sperm traces
 Sufficient for: 25 tests
 Color change: white → violet



Phosphatesmo MI

REF 906 12

This test strip allows the specific detection of alkaline phosphatase in milk. In the dairy industry the test is used for the quick and easy quality control of pasteurized milk.

The strip is dipped into the milk and incubated at 36 °C. If the paper remains white, the pasteurization is complete. The test should be stored at 2–8 °C to ensure optimal results.

Type: test paper
 Limit of sensitivity: 0.5% raw milk in pasteurized milk or 300 U/L alkaline phosphatase in UHT milk
 Sufficient for: 50 tests
 Color change: white → yellow



Plumbtesmo

REF 906 02

The test paper allows the quick and easy detection of lead on surfaces including metal surfaces, dishes, ceramics and toys. In criminal investigations it is used to search for traces of bullets.

The surface in question is moistened with distilled water. The test paper is pressed against the surface for about 2 minutes. In the presence of lead the paper turns pink to dark purple.

Type: test paper
 Limit of sensitivity: 5 mg/L Pb²⁺
 Sufficient for: 40 tests
 Color change: yellow-white → pink-purple

Test papers for qualitative determinations

Description of individual parameters and tests

Potassium test paper

REF 907 27

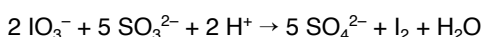
The test paper allows the quick and easy detection of potassium. Rubidium, caesium and thallium(I) give the same reaction. Sodium and heavy metal ions decrease the sensitivity. The leaflet describes a method to eliminate these interferences.

Type: test paper
Limit of sensitivity: 250 mg/L K⁺
Sufficient for: 200 tests
Color change: bright yellow → orange

Potassium iodate starch paper

REF 907 53

The test paper allows the fast detection of sulfite and sulphur dioxide. The paper is used in food analyzing laboratories. The reaction is as follows:



Sulphurous acid or sulfites reduce potassium iodate to free iodine. With starch, iodine gives a characteristic blue-black color. For a detection of sulfite with highly sensitivity we recommend Sulfite test paper (REF 907 63, page 44)

Type: test paper
Limit of sensitivity: 5 mg/L SO₂
Presentation: reel of 5 m length
Color change: white → blue-black

Potassium iodide starch paper

This test paper allows the quick and easy detection of strong oxidizers like nitrite and free chlorine. It also used to control diazotization reactions. Nitrite or free chlorine oxidize potassium iodide to form elemental iodine which reacts with starch to a blue-violet complex.

Potassium iodide starch paper may be used by dipping it into the sample or by applying drops of the sample to the paper.

MN 816 N standard grade

REF 907 54

MN 616 T recommended for spot tests

REF 907 58

Type: test paper
Limit of sensitivity: 1 mg/L NO₂⁻ / 1 mg/L free Cl₂
Presentation: reel of 5 m length (907 54) or box of 200 strips (907 58)
Color change: white → blue-violet

The standard grade is also available as refill (REF 907 55) and booklet with 100 strips (REF 907 56).

Silver test paper

REF 907 32

The test paper allows the quick and easy detection of silver ions. These cause red-violet spots on a salmon background. The leaflet describes a method to eliminate interferences of Hg, Cu, Au, Pt and Pd.

Type: test paper
Limit of sensitivity: 20 mg/L Ag⁺
Sufficient for: 40 tests
Color change: salmon → red-violet

Sulfide test paper

REF 907 61

The test paper allows the easy and reliable detection of hydrogen sulfide. This gas occurs in the processing of raw oil. It is toxic even in low concentrations. Therefore, critical points are carefully checked. Sulfide ions in solution also give a positive reaction.

The frequently used Lead acetate paper (REF 907 44, page 40) is toxic and needs to be declared as hazardous. Sulfide test paper provides an alternative which is non toxic and safe.

Type: test paper
Limit of sensitivity: 1 drop of a solution containing 5 mg/L sulfide (S²⁻) shows a positive reaction
Presentation: roll of 5 m length
Color change: white → brown-black



Test papers for qualitative determinations

Description of individual parameters and tests

Sulfite test paper

REF 907 63

The test paper allows the quick and easy detection of sulfite and sulfur dioxide. In food analyzing laboratories it is used to detect sulfite in meat products. In medical diagnostics it is used as a quick test on sulfite oxidase deficiency.

Type: test paper
 Limit of sensitivity: 10 mg/L Na_2SO_3
 Sufficient for: 100 tests
 Color change: white → pink-red

Turmeric paper

REF 907 47

The test paper allows the quick and easy detection of boric acid and borates. It is impregnated with curcumin, the yellow dye extracted from the roots of *curcuma tinctoria* (yellow ginger). The paper is dipped into the sample containing hydrochloric acid (pH 1–2). Afterwards it is allowed to dry. In presence of borate the paper turns orange to red. Dipping into conc. sodium hydroxide causes a green-black color. In the absence of borate, sodium hydroxide leads to a brown-red color.

Oxidizing substances and iodide interfere.

Type: test paper
 Limit of sensitivity: 20 mg/L B (100 mg/L H_3BO_3)
 Sufficient for: 200 tests
 Color change: yellow → red;



Udder test paper

REF 907 48

The test paper allows the quick and easy detection of the pH of milk. It is used as a screening test on mastitis. Milk of infected cattle must not be sold.

All four tits of the udder require testing. A drop of milk is placed on the test zone. For healthy cows the color turns to yellow-red (pH 6.4–6.6). A green (pH 7) or blue (pH 8) color indicates mastitis. If the indicator remains yellow, the pH of the milk is about 6.3. This finding is likewise pathological and requires further diagnostic or therapeutic action.

Type: test paper
 Limit of sensitivity: mastitis traces
 Sufficient for: 20 x 4 tests
 Color change: yellow → green → blue

Watesmo

REF 906 09

The test paper allows the quick and easy detection of water and water vapor. On contact with water the paper changes color from light blue to dark blue. The reaction is not reversible. Even after drying, the contact with water can clearly be proved.

The test paper is used to control the leak-tightness of tubing or to detect condensed water. It can also be used to control if sensitive products like electronics come into contact with water. This helps to detect unjustified complaints.

In chemical laboratories the test paper is used to control solvents. If the paper remains uncolored after evaporation of the solvent, the solvent is anhydrous. In reactions sensitive to water it can then safely be used.

For the detection of water vapor in gas streams the paper is moistened with anhydrous isopropanol. The gas stream is directed on the paper. The presence of water vapor is indicated by a blue color.

Type: test paper
 Limit of sensitivity: H_2O traces
 Presentation: reel of 5 m length
 Color change: light blue → dark blue

Test papers for qualitative determinations

Description of individual parameters and tests

Water

REF 906 10

The test paper allows the quick and easy determination of the water distribution in butter. It is a special presentation of Watesmo for the dairy industry.

On contact with water the paper develops dark spots. Size and number of these spots are correlated to the distribution of water in butter. This is evaluated with a 5-point evaluation chart described in DIN 10 311.

For water detection for other applications we recommend Watesmo (REF 906 09, page 44).

Type: test paper
Limit of sensitivity: H₂O traces
Sufficient for: 50 tests
Color change: light blue → dark blue

Zirconium test paper

REF 907 21

This test paper allows the quick and easy detection of zirconium. When used in accordance with the instructions, the test paper shows red-violet spots against a yellow background. The color reaction is specifically for zirconium; only hafnium interfere.

The Zirconium test paper can also be used for the determination of aluminum by following the instructions applicable to the aluminum test paper.

Type: test paper
Limit of sensitivity: 20 mg/L Zr⁴⁺
Sufficient for: 100 tests
Color change: yellow → red-violet



Test strips and test papers

Combinations of several test papers and test strips

Test paper analysis case

NEW!

- Individual packaging for any testing needs
- Stable and rugged case with premium foam inlay
- Easy storage and transport

Test paper analysis case

REF 913 990

We have designed the test paper analysis case for your individual testing needs. You can equip the case with your personal selection of our pH indicator paper, pH-Fix test strips, as well as all our strips and papers for semi-quantitative and qualitative determinations.

Simple and fast analysis all in one case

- You can also fit all the products featured in our focus flyers for different applications.
- Our smallest case solution fits all strips and papers from the vast MACHEREY-NAGEL test paper and test strip range.

Empty case for individual needs

- The case can be equipped with almost any test from the MACHEREY-NAGEL Rapid Test product line
- Individual combinations of up to



- 9 test strips tubes / 5 reagent bottles
- 2 reagent vessels, 4 measuring spoons and 1 beaker



- 2 classic flat boxes of pH-Fix
- 1 test paper reel



- 1 PlopTop tube pH-Fix PT
- 1 test paper box

Customized case solutions

Catering to individual customer needs is of the great importance to MACHEREY-NAGEL. Even though our case solutions already provide a high level of flexibility, we recognize that some customers may have specific requirements outside our existing case solutions. Therefore, we offer entirely individual solutions with a foam inlay designed exactly to your specifications and testing needs. Starting at a minimum of 50 cases, we can provide you with a case that perfectly fits your personal requirements. In addition to a special inlay, we also offer readily packed cases starting at a minimum quantity of 50 cases as well.

Thus, within our highly flexible case range, we can provide virtually any customer with the perfect testing and transportation solution.

For additional case solutions with *VISOCOLOR*® test kits, see page 70



Medi Test urine analysis test strips

The use of urine test strips is acknowledged as modern screening method in medical practice. With these non-invasive tests important information on the health status of the patient is rapidly obtained. The urine sample is easily drawn and can immediately be investigated with a test strip. Thus one obtains within minutes a result, which facilitates the decision for further diagnostic and therapeutic action.

- Urine test strips offer a rapid survey of the health status of a patient
- Urine chemistry – rapid and reliable



DiaQuant® test strips for dialysis

In dialysis, reliable on-site chemical testing is a critical factor for patient safety. Accurate and quick testing is also fundamental to run a dialysis center effectively and successfully.

The new DiaQuant® line from MACHEREY-NAGEL is designed for the dialysis environment. Our proven technology makes testing reliable and accurate, thus providing a safe environment for your patients.

Fast results

Health care professionals use DiaQuant® tests for a variety of different substances. The product group offers a complete range of testing equipment for disinfection and water supply. All tests follow an easy Dip & Read procedure and provide reliable results in 5–10 seconds.

Easy to use

All DiaQuant® tests are ready-to-use kits. They are pre-calibrated and do not need further equipment or reagents. As “lab in the pocket” they are easy to use for any health care professional.

Precise readings

The color charts are adjusted and checked using standard solutions. Users can be sure to receive accurate readings whenever they test.



If you are interested in our programme of test strips and reflectometers for in-vitro medical diagnostics, please contact us.

Test kits for water analysis

Description of individual parameters and tests

Test kits for water analysis	50
<i>VISOCOLOR® alpha</i>	51
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<i>VISOCOLOR® HE</i>	53
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Compact photometer PF-12	74

Test kits for water analysis

VISOCOLOR® test kits and reagent cases

Compact and flexible

- Complete mini-laboratories with reagents and accessories for water analysis
- Chemical analysis without additional accessories and without the need for any prior experience in chemistry
- Suitable for analysis in labs or directly on-site
- 3 product lines with different accuracies, precisions and sensitivities for universal use depending on the analytical requirement
- Various measuring methods and detection principles for all parameters from acidity to zinc
- VISOCOLOR® reagent cases as portable laboratories with individual combinations of different test kits

Simple and precise

- Comfortable test procedures since test kits are based on simple chemical-analytical methods like colorimetry and titration
- Instructions in different languages and with pictograms for safe and simple test performance
- Color-coded reagent bottles for clear identification of reagents
- Fast-dissolving reagents save time and facilitate the daily work – no crushing of tablets and no stirring of reaction solutions are necessary

Reliable and safe

- Reliable and comparable results – the reaction principles of VISOCOLOR® tests are based on internationally acknowledged regulations like DIN-, EN-, ISO- and EPA standards
- Maximum safety for the user and easy disposal of used reagents by avoiding of dangerous and environmentally hazardous substances
- Low susceptibility to interferences, high selectivity with regards to the substance to be analyzed as well as compensation of turbidities and colors guarantee reliable results
- Additional increase of accuracy and reproducibility by photometric determination of VISOCOLOR® ECO tests with the photometer PF-12



VISOCOLOR® alpha tests use colorimetric, as well as titrimetric procedures. Use of multicomponent reagents results in a very convenient, rapid and safe handling, because often only one reagent is needed for each test.

The reagent bottles are packed in practical blister packs. The cardboard back is used for opening and closing the package, and also provides all information required for the test: instruc-

tions for use in 6 languages with pictograms, as well as a color comparison chart for colorimetric evaluations. The blister packs of the VISOCOLOR® alpha test kits have a punched hole for convenient storage or display in showrooms or at sales counters.

Colorimetric tests

Principle:

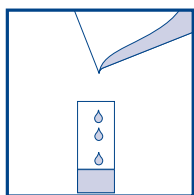
Colorimetry with color comparison card

- Visual evaluation
- Environment-friendly
- Cost-efficient
- Convenient handling, as easy as test strips
- Accurate results
- Handy packages
- With pictogram instructions
- Reagent bottles with clear dosing instructions

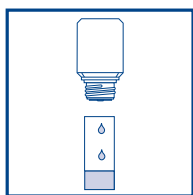


Test kit consists of plastic pack with:

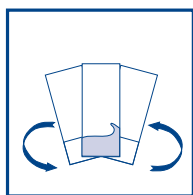
- Sample tube with 5 mL ring mark
- Color coded bottles with liquid or powder reagents
- Measuring spoon for accurate dosage of solid reagents
- Color scale with at least 5 gradations



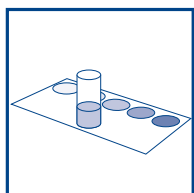
Fill the sample



Add reagent



Mix



Analyze

Titration test kits

Principle:

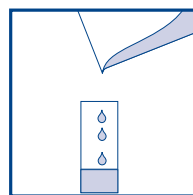
Titration with drop counting

- Visual evaluation
- Environment-friendly
- Cost-efficient
- Convenient handling, as easy as test strips
- Accurate results
- Indicator and titration solution in one dropping bottle
- Handy packages
- With pictogram instructions
- Reagent bottles with clear dosing instructions

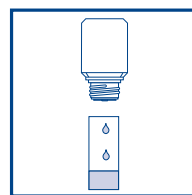


Test kit consists of plastic pack with:

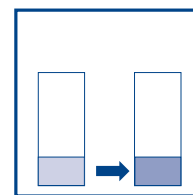
- Sample tube with 5 mL ring mark
- One dropping bottle with mixture of indicator and titration solution



Fill the sample



Add reagent



Color change

Count the drops: 1 drop = 1 measuring unit

Test kits for water analysis

VISOCOLOR® ECO

VISOCOLOR® ECO presents a product group of colorimetric and titrimetric test kits which avoids hazardous substances wherever possible. With VISOCOLOR® ECO even water constituents with low limiting values can be determined with sufficient accuracy.

All VISOCOLOR® ECO test kits are packed in an environment-friendly box and contain easy to understand instructions in 6 languages.

Colorimetric test kits

Principle:

Colorimetry with color comparison card

- Visual and photometric evaluation (PF-12)
- Environment-friendly
- Economic
- Convenient handling
- Higher accuracy and sensitivity
- With pictogram instructions
- Reagent bottles with clear dosing instructions
- Compensation of turbidity and colors
- Refill packs available



Titration test kits

Principle:

Titration with drop counting

- Visual evaluation
- Environment-friendly
- Economic
- Convenient handling
- Higher accuracy and sensitivity
- Clearer color change due to separated dropping reagents
- Reagent bottles with clear dosing instructions

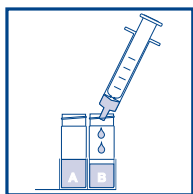


Test kit consists of cardboard box with:

- 2 measuring tubes 20 mm diameter with screw caps
- Holder for the measuring tubes
- Color coded bottles with liquid or powder reagents
- Graduated plastic syringe 5 mL for convenient sample dosage
- Measuring spoon for accurate dosage of solid reagents
- Color comparison card with at least 5 gradations

Test kit consists of cardboard box with:

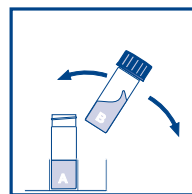
- Sample tube with 5 mL ring mark
- Graduated plastic syringe 5 mL for convenient sample dosage
- Dropping bottle(s) with indicator solution
- Dropping bottle(s) with titration solution



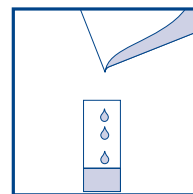
Fill the sample



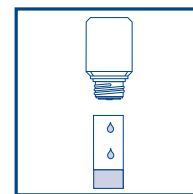
Add reagent



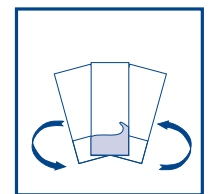
Mix



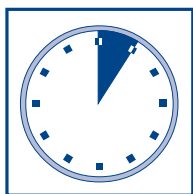
Fill the sample



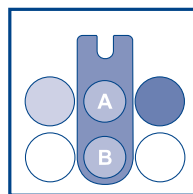
Add indicator



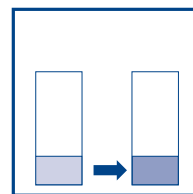
Titration solution



Wait



Analyze



Color change

VISOCOLOR® HE test kits are highly sensitive colorimetric test kits. In comparison with conventional VISOCOLOR® kits, their sensitivity is enhanced by increasing the length of the test tube and the use of highly sensitive reagents. This technique allows a 10-fold to 100-fold increase in sensitivity. Each VISOCOLOR® HE test kit is packed in a robust plastic box

Colorimetric test kits

Principle:

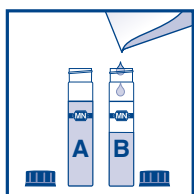
High sensitivity colorimetry with comparator block and color comparison disc

- Visual evaluation
- Environment-friendly
- Convenient handling
- Highest accuracy due to extremely narrow gradation
- Highest sensitivity down to 0.002 mg/L due to longer measuring tubes
- Reagent bottles with clear dosing instructions
- Compensation of turbidity and colors
- Refill packs available

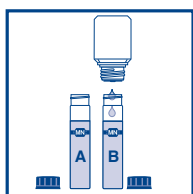


Test kit consists of plastic box with:

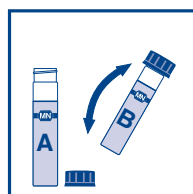
- 2 measuring tubes 20 mm diameter with screw caps
- Comparator block with color comparison disk
- Color coded bottles with liquid or powder reagents
- Measuring spoon for accurate dosage of solid reagents
- Beaker for convenient sample dosage



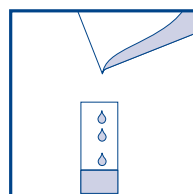
Fill the sample



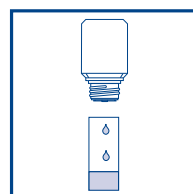
Add reagent



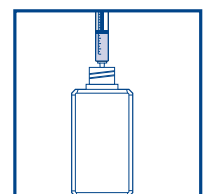
Mix



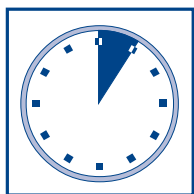
Fill the sample



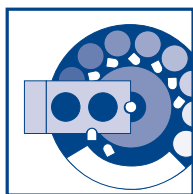
Add reagent



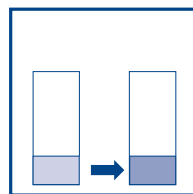
Mix



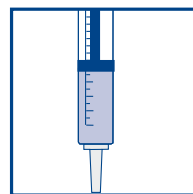
Wait



Analyze



Wait



Analyze

which contains the comparator block with color comparison disk and all required reagents. The VISOCOLOR® titration test kits are based on principles of volumetric analysis. On the graduated syringe the results can be read off in mg/L or in alternative dimensions.

Titration test kits

Principle:

High sensitive volumetric analysis with graduated syringe

- Visual evaluation
- Convenient handling
- Highest accuracy due to narrowly graduated syringe
- Reagent bottles with clear dosing instructions
- Clearer color change due to separated dropping reagents
- Refill packs available



Test kit consists of cardboard box with:

- Sample tube with 5 mL ring mark
- Graduated syringe for precise reagent dosage
- Bottle(s) with indicator solution
- Bottle(s) with titration solution

Test kits for water analysis

VISOCOLOR® program

VISOCOLOR® tests kits are complete plastic boxes with all reagents and accessories for a test.

Refill packs are for the replacement of used reagents in a

test kit or reagent case. They don't come with a color chart or accessories.

Ordering information

Test	Range	Type	No of tests	REF	
				test kit	refill pack
Acidity AC 7 (base capacity)	0.2–7.0 mmol/L H ⁺ ¹⁾	HE	200	915 006	915 206
Alkalinity AL 7* (total)	0.2–7.0 mmol/L OH ⁻ ¹⁾	HE	200	915 007	915 207
Alkalinity (p/m-Wert) see Carbonate hardness C 20					
Aluminum	0.10–0.50 mg/L Al ³⁺	ECO	50	931 006	931 206
Ammonium 15*	0.5–15 mg/L NH ₄ ⁺	ECO	50	931 010	931 210
Ammonium	0.2–3 mg/L NH ₄ ⁺	alpha	50	935 012	–
Ammonium 3*	0.2–3 mg/L NH ₄ ⁺	ECO	50	931 008	931 208
Ammonium*	0.02–0.50 mg/L NH ₄ ⁺	HE	110	920 006	920 106
Calcium CA 20*	0.6–25.0 °e / 0.1–3.6 mmol/L Ca ²⁺ ¹⁾	HE	200	915 010	915 210
Calcium*	1 drop \triangleq 5 mg/L Ca ²⁺	ECO	100	931 012	–
Carbonate hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	alpha	100	935 016	–
Carbonate hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	ECO	100	931 014	–
Carbonate hardness C 20 (p-/m-Wert)	0.6–25.0 °e / 0.2–7.2 mmol/L H ⁺ ¹⁾	HE	200	915 003	915 203
Chloride*	1–60 mg/L Cl ⁻	ECO	90	931 018	931 218
Chloride CL 500*	5–500 mg/L Cl ⁻ ¹⁾	HE	300	915 004	915 204
Chlorine, free	0.25–2.0 mg/L Cl ₂	alpha	150	935 019	–
Chlorine 2, free + total	0.1–2.0 mg/L Cl ₂	ECO	150	931 015	931 215
free Chlorine 2	0.1–2.0 mg/L Cl ₂	ECO	150	931 016	931 216
Chlorine 6, free + total ²⁾	0.05–6.00 mg/L Cl ₂	ECO	200	–	931 217
free Chlorine 6 ²⁾	0.05–6.00 mg/L Cl ₂	ECO	400	–	931 219
Chlorine	0.02–0.60 mg/L Cl ₂	HE	160	920 015	920 115
Chlorine + pH see Swimming pool					
Chlorine dioxide*	NEW! <0.2–3.8 mg/L ClO ₂	ECO	150	931 021	931 221
Chromium(VI)*	0.02–0.50 mg/L Cr(VI)	ECO	140	931 020	931 220
Copper	0.1–1.5 mg/L Cu ²⁺	ECO	100	931 037	931 237
Copper	0.04–0.50 mg/L Cu ²⁺	HE	150	920 050	920 150
Cyanide*	0.01–0.20 mg/L CN ⁻	ECO	100	931 022	931 222
Cyanide*	0.002–0.04 mg/L CN ⁻	HE	55	920 028	920 128
Cyanuric acid	10–100 mg/L Cya	ECO	100	931 023	931 223
DEHA (diethylhydroxylamine)	0.01–0.30 mg/L DEHA	ECO	125	931 024	931 224
Fluoride ³⁾	0.1–2.0 mg/L F ⁻	ECO	150	–	931 227
total Hardness*	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	alpha	100	935 042	–
total Hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	ECO	110	931 029	–
total Hardness H 20 F	0.6–25.0 °e / 0.1–3.6 mmol/L Ca ²⁺ ¹⁾	HE	200	915 005	915 205
total Hardness H 2*	0.05–2.00 °d / 0.01–0.36 mmol/L Ca ²⁺ ¹⁾	HE	200	915 002	915 202
residual Hardness *	0.04–0.30 °d	alpha	200	935 080	–
Hydrazine*	0.05–0.40 mg/L N ₂ H ₄	ECO	130	931 030	931 230
Iron 1*	NEW! 0.04–1.0 mg/L Fe	ECO	200	931 025	931 225
Iron 2	0.04–1.0 mg/L Fe	ECO	100	931 026	931 226
Iron	0.01–0.20 mg/L Fe	HE	300	920 040	920 140
Manganese*	0.1–1.5 mg/L Mn	ECO	70	931 038	931 238
Manganese*	0.03–0.50 mg/L Mn	HE	100	920 055	920 155

¹⁾ For titration test kits the range can be increased with additional reagent syringe.

²⁾ only for the photometric determination with PF-11, PF-12 and VISOCOLOR® photino

³⁾ only for the photometric determination with PF-11 and PF-12

⁴⁾ based on the chemical procedures of the German Standard Methods (DEV)

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Test kits for water analysis

VISOCOLOR® program

Test	Range	Type	No of tests	REF test kit	refill pack
Nickel*	0.1–1.5 mg/L Ni ²⁺	ECO	150	931 040	931 240
Nitrate*	2–50 mg/L NO ₃ ⁻	alpha	100	935 065	–
Nitrate*	1–120 mg/L NO ₃ ⁻	ECO	110	931 041	931 241
Nitrite*	0.05–1.0 mg/L NO ₂ ⁻	alpha	200	935 066	–
Nitrite	0.02–0.5 mg/L NO ₂ ⁻	ECO	120	931 044	931 244
Nitrite	0.005–0.10 mg/L NO ₂ ⁻	HE	150	920 063	920 163
pH 5–9*	pH 5.0–9.0	alpha	200	935 075	–
pH 4.0–9.0	pH 4.0–9.0	ECO	450	931 066	931 266
pH 4.0–10.0	pH 4.0–10.0	HE	500	920 074	920 174
pH 6.0–8.2 ²⁾	pH 6.0–8.2	ECO	150	–	931 270
Phosphate*	2–20 mg/L PO ₄ ³⁻	alpha	70	935 079	–
Phosphate*	0.2–5 mg/L P	ECO	80	931 084	931 284
Phosphate*	0.05–1.0 mg/L P	HE	300	920 082	920 182
Phosphate* (DEV) ⁴⁾	0.01–0.25 mg/L P	HE	100	920 080	920 180
Potassium*	2–15 mg/L K ⁺	ECO	60	931 032	931 232
Residual hardness	see Hardness (residual)				
Oxygen*	1–10 mg/L O ₂	ECO	50	931 088	931 288
Oxygen SA 10*	0.2–10 mg/L O ₂ ¹⁾	HE	100	915 009	915 209
Silica / silicon	0.2–3.0 mg/L SiO ₂	ECO	80	931 033	931 233
Silica* / silicon	0.01–0.30 mg/L Si	HE	120	920 087	920 187
Sulfate*	25–200 mg/L SO ₄ ²⁻	ECO	100	931 092	931 292
Sulfide*	0.1–0.8 mg/L S ²⁻	ECO	90	931 094	931 294
Sulfite	1 drop \triangleq 1 mg/L SO ₃ ²⁻	ECO	60	931 095	–
Sulfite SU 100*	2–100 mg/L SO ₃ ²⁻ ¹⁾	HE	100	915 008	915 208
Swimming pool (Chlorine + pH)	0.1–2.0 mg/L Cl ₂ pH 6.9–8.2	ECO	150 150	931 090	931 290
Zinc	0.5–3 mg/L Zn ²⁺	ECO	120	931 098	931 298

¹⁾ For titration test kits the range can be increased with additional reagent syringe.

²⁾ only for the photometric determination with PF-11, PF-12 and VISOCOLOR® photino

³⁾ only for the photometric determination with PF-11 and PF-12

⁴⁾ based on the chemical procedures of the German Standard Methods (DEV)

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.



visocolor®

Test kits for water analysis

Analytical principles

Colorimetry

In colorimetric procedures advantage is taken of the fact that certain reagents form colored compounds with the substances to be determined. The intensity of the color is directly related to the concentration of the substance in question. For example in the case of the *VISOCOLOR*[®] Nitrite, the reagents form a blue-red dye with nitrite. The resulting color intensity is proportional to the concentration of nitrite. In the case of pH measurements the use of specific indicator mixtures permits the formation of a characteristic color for each pH value. The reaction colors obtained are compared with a range of standards in a sample vessel called comparator. As soon as the reaction color has been matched to a comparison color, the result can be read from the comparator or color charts.

Volumetric analysis (titration)

For certain substances it is difficult or even impossible to convert them to compounds which can be colorimetrically evaluated. In many of these cases titrimetric methods are used for analysis. This measuring principle is based on the following idea: In volumetric analysis, individual drops of a titration solution are added to a defined volume of sample solution. The active substance in the titration solution reacts with the substance to be determined in the sample. After complete reaction further addition of titration solution would cause an excess of the active substance. The point of complete reaction (end point or equivalence point) is visualized by the color change of an indicator added to the sample.

Description of individual parameters and tests

Acidity

H⁺

In natural unpolluted waters mainly carbonic acid but also humic acids are present. With this test kit, all acids, i. e. also those present in industrial waters, can be determined.

Reaction basis:

Titrimetric determination of acids with sodium hydroxide solution against the p-indicator (Reaction basis according to DIN 38409-H7).

Note:

To differentiate between mineral acids and carbonic acid, the sample should be titrated against the m-indicator from the test kit *VISOCOLOR*[®] HE Carbonate hardness C 20.

VISOCOLOR[®] HE Acidity AC 7

REF 915 006

Refill pack

REF 915 206

Type: titration test kit
Range: 0.2–7.0 mmol/L H⁺
1 gradation mark = 0.2 mmol/L H⁺
Sufficient for: about 200 tests with an average acid content of 4 mmol/L H⁺
Shelf life: at least 2 years
Sea water suitability: yes

VISOCOLOR[®] HE Alkalinity AL 7

REF 915 007

Refill pack

REF 915 207

Type: titration test kit
Range: 0.2–7.0 mmol/L OH⁻
1 gradation mark = 0.2 mmol/L OH⁻
Sufficient for: about 200 tests with an average acid content of 4 mmol/L OH⁻
Shelf life: at least 2 years
Sea water suitability: yes

Alkalinity (total)

OH⁻

All compounds which cause a pH increase above pH 7 are determined, e.g. hydroxide, carbonate, hydrogen carbonate etc.

Reaction basis:

Titrimetric alkalinity determination with hydrochloric acid against the m-indicator (Reaction basis according to DIN 38409-H7).

Note:

To differentiate between hydroxide, carbonate and hydrogen carbonate you should use the test kit *VISOCOLOR*[®] HE Carbonate hardness C 20 (see German Standard Methods DIN 38 409-H7).

Aluminum

Al³⁺

Aluminum is the most common metal in our anthroposphere and behind oxygen and silica the most common element of the earth's crust. Because of its big affinity to oxygen, aluminum does not exist in elemental form in nature, but in different oxidized compounds.

For drinking water, the WHO recommends a threshold value of 0.2 mg/L Al³⁺. In accordance to the EU council guideline 98/83/EEC, the threshold value for drinking water is 0.2 mg/L Al³⁺. In natural waters, the concentration of aluminum compounds is usually low, but waste water can contain aluminum in higher concentrations, e.g. at electroplating companies or paper mills. Different national regulations tolerate 2–3 mg/L Al³⁺ in effluents from various industries (metal, electroplating and printing industries).

Reaction basis:

Colorimetric determination with chromazurol S.

VISOCOLOR[®] ECO Aluminum

REF 931 006

Refill pack

REF 931 206

Type: colorimetric test kit
Range: 0 · 0.10 · 0.15 · 0.20 · 0.25 · 0.30 · 0.40 · 0.50 mg/L Al³⁺
Sufficient for: 50 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+9)

Test kits for water analysis

Description of individual parameters and tests

Ammonium



Ammonium ions occur primarily in domestic waste waters, but frequently also in industrial waste waters. In surface and ground waters, ammonium ions indicate decomposition of animal or vegetable matter. Control of the ammonium values is therefore important to the water supply, as a contamination indicator.

Reaction basis:

DEV procedure: in alkaline medium ammonium ions react with chlorine to form chloroamines which in the presence of a catalyst form a blue colored indophenol with phenols (Reaction basis according to DIN 38406-E5).

Primary amines react like ammonium ions resulting in high results.

Chlorine-consuming substances can lower the result or even inhibit the reaction depending on their concentration.

VISOCOLOR® alpha Ammonium REF 935 012

Type: colorimetric test kit
 Range: 0 · 0.2 · 0.5 · 1 · 2 · 3 mg/L NH_4^+
 Sufficient for: 50 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes, after dilution (1+9)

VISOCOLOR® ECO Ammonium 15 REF 931 010 Refill pack REF 931 210

Type: colorimetric test kit
 Range: 0 · 0.5 · 1 · 2 · 3 · 5 · 7 · 10 · 15 mg/L NH_4^+
 Sufficient for: 50 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes, after dilution (1+9)



VISOCOLOR® ECO Ammonium 3 REF 931 008 Refill pack REF 931 208

Type: colorimetric test kit
 Range: 0 · 0.2 · 0.3 · 0.5 · 0.7 · 1 · 2 · 3 mg/L NH_4^+
 Sufficient for: 50 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes, after dilution (1+9)

VISOCOLOR® HE Ammonium REF 920 006 Refill pack REF 920 106

Type: highly sensitive test kit
 Range: 0.0 · 0.02 · 0.04 · 0.07 · 0.10 · 0.15 · 0.20 · 0.30 · 0.40 · 0.50 mg/L NH_4^+
 Sufficient for: 110 tests
 Shelf life: at least 1 year
 Sea water suitability: no

Bromine



Bromine and brominating reagents such as 1,3-dibromo-5,5-dimethylhydantoin (DBH) are used – like chlorine – for disinfecting swimming pool water. For determination of bromine you may use all VISOCOLOR® Chlorine tests (see page 59). A factor for conversion is provided in the instructions.

Calcium



Calcium is widely distributed in nature in rocks and in water. Water containing calcium and magnesium causes problems in industry as well as in households, since during boiling calcium carbonate precipitate as detrimental boiler scale. Additionally, calcium ions inhibit soap foaming.

Reaction basis:

Complexometric titration after precipitation of the magnesium salts (Reaction basis according to DIN 38406-E3).

VISOCOLOR® ECO Calcium REF 931 012

Type: titration test kit
 Range: 1 drop = 5 mg/L Ca^{2+}
 Sufficient for: about 100 tests with an average calcium concentration of 50 mg/L Ca^{2+}
 Shelf life: at least 1.5 years
 Sea water suitability: yes, after dilution (1+4)



VISOCOLOR® HE Calcium CA 20 REF 915 010 Refill pack REF 915 210

Type: titration test kit
 Range: 0.6–25.0 °e or 0.1–3.6 mmol/L Ca^{2+}
 Sufficient for: about 200 tests with an average calcium hardness of 12.5 °e or 1.8 mmol/L Ca^{2+}
 Shelf life: at least 2 years
 Sea water suitability: yes, after dilution (1+4)

Test kits for water analysis

Description of individual parameters and tests

Carbonate hardness



Carbonate hardness is the part of calcium and magnesium ions which are present as carbonate or hydrogen carbonate.

Reaction basis:

The determination is performed as titration with hydrochloric acid against a mixed indicator, which changes color at pH 4.5 (Reaction basis according to DIN EN ISO 9963-1 C24).

Normally the carbonate hardness is smaller than the total hardness. If the carbonate hardness is larger than the total hardness, you should trace the origin of this abnormal conditions, e.g. discharge of alkali hydrogen carbonates or high buffer capacity.

VISOCOLOR® alpha Carbonate hardness REF 935 016

Type: titration test kit
Range: 1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO₃
Sufficient for: about 100 tests with an average hardness of 12.5 °e
Shelf life: at least 1.5 years
Sea water suitability: yes

VISOCOLOR® ECO Carbonate hardness REF 931 014

Type: titration test kit
Range: 1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO₃
Sufficient for: about 100 tests with an average hardness of 12.5 °e
Shelf life: at least 2 years
Sea water suitability: yes



VISOCOLOR® HE Carbonate hardness C 20

REF 915 003
REF 915 203

Refill pack

Type: titration test kit
Range: 0.6–25.0 °e or 0.2–7.0 mmol/L H⁺
Sufficient for: about 200 tests with an average hardness of 12.5 °e or 3.6 mmol/L H⁺
Shelf life: at least 2 years
Sea water suitability: yes

With this test kit you can also determine the partial alkalinity (p-value) in addition to the carbonate hardness (m-value).

Carbonic acid



Carbonic acid is a natural component of water acidity. Determination is performed with the test kit **VISOCOLOR®** Acidity AC 7 (see page 56).

Chloride



Chloride ions occur in all natural waters. Their concentration depends on geological and regional factors. In waste waters and polluted rivers, chloride concentrations can reach high values.

Reaction bases:

- (a) Mercurimetric titration
- (b) Mercury(II) thiocyanate method

VISOCOLOR® ECO Chloride

REF 931 018

Refill pack

REF 931 218

Type: colorimetric test kit
Range: 1 · 2 · 4 · 7 · 12 · 20 · 40 · 60 mg/L Cl⁻
Reaction basis: (b) Mercury(II) thiocyanate method
Sufficient for: 90 tests
Shelf life: at least 1 year
Sea water suitability: no

VISOCOLOR® HE Chloride CL 500

REF 915 004

Refill pack

REF 915 204

Type: titration test kit
Range: 5–500 mg/L Cl⁻
1 gradation mark = 5 mg/L Cl⁻
Reaction basis: (a) Mercurimetric titration
Sufficient for: about 300 tests with an average chloride ion concentration of 200 mg/L Cl⁻
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1:50)



Test kits for water analysis

Description of individual parameters and tests

Chlorine

Cl₂

The addition of chlorine to swimming pools, water reservoirs and water mains is an approved procedure to rid the water of germs. With the correct dose harmful microorganisms are destroyed, many impurities removed and the growth of algae is prevented. However it is imperative that the chlorine content is regularly checked, since excessive chlorine not only impairs the smell and taste of the water but can be hazardous. One distinguishes between free chlorine and bound chlorine (chloroamines); the sum of both is called total chlorine.

Reaction basis:

At a pH value of 5–6 free chlorine reacts with *N,N*-diethyl-1,4-phenylene diamine (DPD) to form a red-violet dye. In the presence of iodide ions the content of total chlorine can be determined, too. (Reaction basis according to DIN ISO 7393 G4-2).

The determination of free chlorine includes the concentrations of bromine, bromoamine, chloroamine, iodine and in part chlorine dioxide.

1.0 mg/L Cl₂ \triangleq 2.3 mg/L Br₂ \triangleq 3.6 mg/L I₂

Higher-valency manganese compounds simulate free chlorine.

Note:

When measuring the chlorine content in swimming pools it is recommended to check the pH value as well. For this purpose we supply combination test kits *VISOCOLOR*[®] *ECO* Swimming pool (page 69).

VISOCOLOR[®] *alpha* Chlorine, free REF 935 019

Type: colorimetric test kit
 Range: 0.25 · 0.5 · 1.0 · 1.5 · 2.0 mg/L Cl₂
 Sufficient for: 150 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes

VISOCOLOR[®] *ECO* Chlorine 2, free + total REF 931 015 Refill pack REF 931 215

Type: colorimetric test kit
 Range: < 0.1 · 0.1 · 0.2 · 0.3 · 0.4 · 0.6 · 0.9 · 1.2 · 2.0 mg/L Cl₂
 Sufficient for: 150 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes



VISOCOLOR[®] *ECO* free Chlorine 2 REF 931 016 Refill pack REF 931 216

Type: colorimetric test kit
 Range: < 0.1 · 0.1 · 0.2 · 0.3 · 0.4 · 0.6 · 0.9 · 1.2 · 2.0 mg/L Cl₂
 Sufficient for: 150 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes

VISOCOLOR[®] *ECO* Chlorine 6, free + total REF 931 217

Type: reagent set for photometric determination
 Range: 0.05–6.00 mg/L Cl₂
 Sufficient for: 200 tests
 Shelf life: at least 2 years
 Sea water suitability: yes
A visual determination is not possible.

VISOCOLOR[®] *ECO* free Chlorine 6 REF 931 219

Type: reagent set for photometric determination
 Range: 0.05–6.00 mg/L Cl₂
 Sufficient for: 400 tests
 Shelf life: at least 2 years
 Sea water suitability: yes
A visual determination is not possible.

VISOCOLOR[®] *HE* Chlorine REF 920 015 Refill pack REF 920 115

Type: highly sensitive test kit
 Range: 0.0 · 0.02 · 0.04 · 0.06 · 0.10 · 0.15 · 0.20 · 0.30 · 0.40 · 0.60 mg/L Cl₂
 Sufficient for: 160 tests
 Shelf life: at least 2 years
 Sea water suitability: yes



visocolor[®]

Test kits for water analysis

Description of individual parameters and tests

Chlorine dioxide

NEW!

ClO₂

Chlorine dioxide is being used as a universal disinfecting reagent, replacing chlorine especially in drinking and swimming pool water processing. Not only does it possess a significantly higher oxidizing power than chlorine but moreover, the formation of toxic THMs (trihalomethanes) is avoided when using chlorine dioxide as the oxidizing agent.

Reaction basis:

Chlorine dioxide reacts, like chlorine, with DPD (*N,N*-diethyl-1,4-phenylenediamine) at a pH value of 5–6 to form a red-violet dye. An additional step makes this test kit even suitable for the determination of chlorine dioxide in presence of chlorine.

VISOCOLOR® ECO Chlorine dioxide

REF 931 021

Refill pack

REF 931 221

Type: colorimetric test kit
Range: <0.2 · 0.2 · 0.4 · 0.6 · 0.8 · 1.1 · 1.7 · 2.3 · 3.8 mg/L ClO₂
Sufficient for: 150 tests
Shelf life: at least 1.5 years
Sea water suitability: no

Chromate

CrO₄²⁻

Chromium compounds can be present in industrial waste waters in trivalent form [chromium(III) ions] and in hexavalent form (chromate and dichromate ions). In order to determine the total chromium all other valencies must be oxidized to chromium(VI). Each test kit is equipped with a detailed description.

Reaction basis:

In sulfuric acid chromate ions react with diphenylcarbazide to form a red-violet dye. (Reaction basis according to DIN EN ISO 7393 G4-2).

VISOCOLOR® ECO Chromium(VI)

REF 931 020

Refill pack

REF 931 220

Type: colorimetric test kit
Range: 0.02 · 0.05 · 0.10 · 0.15 · 0.20 · 0.30 · 0.40 · 0.50 mg/L Cr(VI)
Sufficient for: 140 tests
Shelf life: at least 1.5 years
Sea water suitability: yes



Copper

Cu²⁺

In water, copper(II) can be found in dissolved as well as in undissolved form. Copper(I) compounds and undissolved copper(II) compounds are not determined unless they are decomposed with concentrated nitric acid prior to the test.

Reaction basis:

In weakly alkaline medium copper(II) ions react with cuprizone forming a blue color complex.

VISOCOLOR® ECO Copper

REF 931 037

Refill pack

REF 931 237

Type: colorimetric test kit
Range: 0 · 0.1 · 0.2 · 0.3 · 0.5 · 0.7 · 1.0 · 1.5 mg/L Cu²⁺
Sufficient for: 100 tests
Shelf life: at least 2 years
Sea water suitability: yes

VISOCOLOR® HE Copper

REF 920 050

Refill pack

REF 920 150

Type: highly sensitive test kit
Range: 0.0 · 0.04 · 0.07 · 0.10 · 0.15 · 0.20 · 0.25 · 0.30 · 0.40 · 0.50 mg/L Cu²⁺
Sufficient for: 100 tests
Shelf life: at least 2 years
Sea water suitability: yes



Test kits for water analysis

Description of individual parameters and tests

Cyanide

CN⁻

Cyanide ions are very toxic because they block the iron of the respiratory enzyme and thus inhibit oxygen transport. For humans 1 mg cyanide per kg body weight is considered lethal.

Reaction basis:

Cyanide ions react with chlorine to form cyanogen chloride, which then opens a pyridine ring to form glutaconedialdehyde. By aldol condensation with barbituric acid, a violet polymethine dye is produced.

This test detects free cyanide and cyanide complexes which can be destroyed with chlorine. If interfering substances like heavy metal complexes, thiocyanate, sulfide, dyes or aromatic amines are present, a distillation according to DIN 38 405-D 13-2-2 must precede the cyanide test.

For the determination of easily released and total cyanide as well as for the determination of cyanide in stone fruit spirits, please contact MACHEREY-NAGEL for special instructions.

VISOCOLOR® ECO Cyanide Refill pack

REF 931 022
REF 931 222

Type: colorimetric test kit
Range: 0 · 0.01 · 0.02 · 0.03 · 0.05 · 0.07 · 0.10 · 0.15 · 0.20 mg/L CN⁻
Sufficient for: 100 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+3)



VISOCOLOR® HE Cyanide Refill pack

REF 920 028
REF 920 128

Type: highly sensitive test kit
Range: 0.0 · 0.002 · 0.004 · 0.007 · 0.010 · 0.015 · 0.020 · 0.025 · 0.030 · 0.040 mg/L CN⁻
Sufficient for: 55 tests
Shelf life: at least 1 year
Sea water suitability: yes

Cyanuric acid

Cya

Chlorine for disinfection in swimming pools is degraded by intensive UV radiation. A common stabilizer for chlorine in swimming pools is cyanuric acid. Chloroisocyanic acid is also used directly as a disinfecting agent. Due to legal regulations, as good and careful pool managers, many private and public owners use rapid tests for frequent monitoring of cyanuric acid.

Reaction basis:

Turbidity measurement

Cyanuric acid forms a fine precipitate with a triazine derivative.

The turbidity caused by this reaction can be measured visually or photometrically to determine the cyanuric acid concentration.

Turbidities interfere and must be filtered prior to the analysis.

VISOCOLOR® ECO Cyanuric acid Refill pack

REF 931 023
REF 931 223

Type: colorimetric test kit
Range: 10 · 15 · 20 · 30 · 40 · 60 · 80 · 100 mg/L Cya
Sufficient for: 100 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

DEHA (Diethylhydroxylamine)

DEHA

In boiler feed water treatments, the carcinogenic hydrazine is more and more replaced by diethylhydroxylamine (DEHA) to remove oxygen.

Reaction basis:

Measurement of the reduction properties of DEHA for iron(III) ions and determination of the iron(II) ions formed. Strictly observe the temperature and reaction time since they strongly influence the color intensity.

Iron(II) ions interfere. Modified test procedure eliminate this source of error.

VISOCOLOR® ECO DEHA Refill pack

REF 931 024

Refill pack

REF 931 224

Type: colorimetric test kit
Range: 0 · 0.01 · 0.03 · 0.05 · 0.10 · 0.15 · 0.20 · 0.25 · 0.30 mg/L DEHA
Sufficient for: 125 tests
Shelf life: at least 1 year
Sea water suitability: yes



Test kits for water analysis

Description of individual parameters and tests

Dithionite



Dithionites ($S_2O_4^{2-}$), above all sodium dithionite (so-called hydrosulfite), are important aids in dyeing, textile and paper industries due to their reducing properties. They are especially used for vat dyeing, for bleaching of wood-based paper, sugar, sirup, gelatine, starche, molasses, saccharine juice, soap, technical fats, as decolorant for textiles, for desilvering of used fixing baths etc. Dithionite can be determined using a special method with *VISOCOLOR*[®] Sulfite SU 100. Please contact MACHEREY-NAGEL for special instructions.

Fluoride



Normally, the content of fluoride in surface and ground water is lower than 1 mg/L. Permanent consumption of water containing more than 2 mg/L fluoride can cause a drinking water fluorese (a stained discoloration of the tooth enamel). On the other hand a content of fluoride lower than 0.5 mg/L could lead to an increased cavity risk. The optimal content of fluoride in drinking water is about 1 mg/L. To avoid cavity problems, in some countries the content of fluoride in drinking water is increased artificially. However, WHO and EC drinking water regulations recommend a threshold value of 1.5 mg/L F^- .

In some European countries, the threshold value for mineral water is also 1.5 mg/L F^- . For water used in the preparation of baby food a threshold value of 0.7 mg/L F^- is recommended. Natural mineral waters with a fluoride content of more than 5 mg/L must be labelled with a warning.

Reaction basis:

Photometric determination of fluoride with 1,8-dihydroxy-2-(4-sulfophenylazo)naphthalene-3,6-disulfonic acid (SPADNS) with the photometer PF-12.

VISOCOLOR[®] ECO Fluoride

REF 931 227

Type: reagent set for photometric determination
Range: 0.1–2.0 mg/L F^-
Sufficient for: 150 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after distillation

A visual determination is not possible

Hardness (total and residual)



The total hardness of water is based on its content of alkaline earth ions (calcium and magnesium ions). This content depends on the geological conditions and may vary considerably. Knowledge of the total hardness is important for the use of water in industrial as well as municipal applications, e.g. in the household as wash water or as boiler feed water in industry.

Reaction bases:

(a) Complexometric titration
in accordance with DIN 38406 E3 and DIN 38409 H6.

(b) Colorimetry with a mixed indicator

Copper(II) ions can delay or (in higher concentrations) even block the color change of the indicator. For this reason allow enough water to run through copper pipes prior to sampling.

VISOCOLOR[®] alpha total Hardness

REF 935 042

Type: titration test kit
Range: 1 drop \triangleq 1.25 $^{\circ}e \triangleq$ 17.8 mg/L $CaCO_3$
Reaction basis: (a) titration
Sufficient for: 100 tests with an average hardness of 12.5 $^{\circ}e$
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1:30)

VISOCOLOR[®] ECO total Hardness

REF 931 029

Type: titration test kit
Range: 1 drop \triangleq 1.25 $^{\circ}e \triangleq$ 17.8 mg/L $CaCO_3$
Reaction basis: (a) titration
Sufficient for: 110 tests with an average hardness of 12.5 $^{\circ}e$
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1:30)



VISOCOLOR[®] HE total Hardness H 20 F Refill pack

**REF 915 005
REF 915 205**

Type: titration test kit
Range: 0.6–25.0 $^{\circ}e$ or
0.1–3.6 mmol/L Ca^{2+}
1 gradation mark = 0.5 $^{\circ}d =$
0.1 mmol/L Ca^{2+}
Reaction basis: (a) titration
Sufficient for: about 200 tests with an average hardness of 12.5 $^{\circ}e$ or 1.8 mmol/L Ca^{2+}
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1:30)

Test kits for water analysis

Description of individual parameters and tests

VISOCOLOR® *alpha* residual Hardness REF 935 080

Type: colorimetric test kit
 Range: 0.00 · 0.05 · 0.10 · 0.19 · 0.38 °e
 Reaction basis: (b) colorimetry
 Sufficient for: 200 tests
 Shelf life: at least 1 year
 Sea water suitability: no

VISOCOLOR® HE Hardness H 2 REF 915 002

Refill pack REF 915 202
 Type: titration test kit
 Range: 0.06–2.50 °e or
 0.01–0.36 mmol/L Ca²⁺
 1 gradation mark = 0.06 °e or
 0.01 mmol/L Ca²⁺

Reaction basis: (a) titration
 Sufficient for: 200 tests with an average hardness
 of 1.25 °e or 0.18 mmol/L Ca²⁺
 Shelf life: at least 1.5 years
 Sea water suitability: no

VISOCOLOR® ECO additive reagent Z-1 REF 931 929

to eliminate copper ions during determination of total hardness

Hydrazine



Hydrazine is used to destroy residual oxygen in boiler feed water and condensate water, for example in power plants, to avoid corrosion of the boiler casing. Reaction products are merely nitrogen gas and water, thus the salt load of the water is kept low.

Because of its highly reactive properties, hydrazine is also used as fuel in aviation and astronautics.

Hydrazine is toxic and has a highly toxic effect on water organisms. Hydrazine can be absorbed through the skin. Therefore, water and waste water with potential content of hydrazine must be monitored and tested.

Reaction basis:

DIN method: In acidic solution hydrazine reacts with 4-dimethylaminobenzaldehyde to form a yellow/orange colored compound (Reaction basis according to DIN 38413-P1).

VISOCOLOR® ECO Hydrazine REF 931 030

Refill pack REF 931 230
 Type: titration test kit
 Range: 0 · 0.05 · 0.10 · 0.15 · 0.20 · 0.25 ·
 0.30 · 0.40 mg/L N₂H₄
 Sufficient for: 130 tests
 Shelf life: at least 1 year
 Sea water suitability: yes

Hydrosulfite



see Dithionite, page 62

Iron

Fe

Natural waters as well as waste waters often contain some iron. It can be present as Fe(II) or Fe(III) ions if the pH value of the water is below 3 or if the water is free of oxygen. At higher pH values Fe(III) forms an insoluble oxyhydrate. Frequently the sample is in a transition state with finely dispersed iron oxides. In waste water and natural water containing humic acids iron is often present in the form of a complex salt. The VISOCOLOR® test kits only determine iron which is present in dissolved form as Fe²⁺ or Fe³⁺ ions. Iron complexes are not covered unless they are decomposed by oxidation with nitric acid and sulfuric acid.

Reaction basis:

Triazin-Method: iron(II) ions react with a triazine derivative to form a violet complex. Iron(III) ions are reduced and thus also determined.

VISOCOLOR® ECO Iron 1

NEW!

REF 931 025

Refill pack

REF 931 225

Type: colorimetric test kit
 Range: 0 · 0.04 · 0.07 · 0.10 · 0.15 · 0.20 ·
 0.30 · 0.50 · 1.0 mg/L Fe

Sufficient for: 200 tests
 Shelf life: at least 2 years
 Sea water suitability: yes

VISOCOLOR® ECO Iron 2

REF 931 026

Refill pack

REF 931 226

Type: colorimetric test kit
 Range: 0 · 0.04 · 0.07 · 0.10 · 0.15 · 0.20 ·
 0.30 · 0.50 · 1.0 mg/L Fe

Sufficient for: 100 tests
 Shelf life: at least 2 years
 Sea water suitability: yes

VISOCOLOR® HE Iron

REF 920 040

Refill pack

REF 920 140

Type: highly sensitive test kit
 Range: 0.0 · 0.01 · 0.02 · 0.03 · 0.04 · 0.05 ·
 0.07 · 0.10 · 0.15 · 0.20 mg/L Fe

Sufficient for: 300 tests
 Shelf life: at least 2 years
 Sea water suitability: no



Test kits for water analysis

Description of individual parameters and tests

Magnesium

Mg²⁺

In order to differentiate between the hardness constituents calcium and magnesium one can determine the total hardness (see hardness, page 62) and the calcium hardness (see calcium, page 57). The difference of both is the magnesium content – an important parameter in food and building industries.

Manganese

Mn

Natural waters contain manganese in the divalent, soluble form as well as in colloidal tri- and tetravalent states. Valencies are interchangeable due to oxidation-reduction reactions taking place in the water. The test procedure determines all oxidation states of manganese.

Reaction basis:

In alkaline solution manganese ions react with formaldoxime to form an orange-red complex. (Reaction basis according to DIN 38406-E2).

VISOCOLOR® ECO Manganese

REF 931 038

Refill pack

REF 931 238

Type: colorimetric test kit
Range: 0 · 0.1 · 0.2 · 0.3 · 0.5 · 0.7 · 0.9 ·
1.2 · 1.5 mg/L Mn

Sufficient for: 70 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

VISOCOLOR® HE Manganese

REF 920 055

Refill pack

REF 920 155

Type: highly sensitive test kit
Range: 0.0 · 0.03 · 0.06 · 0.10 · 0.15 · 0.20 ·
0.25 · 0.30 · 0.40 · 0.50 mg/L Mn

Sufficient for: 100 tests
Shelf life: at least 1.5 years
Sea water suitability: no



Nickel

Ni²⁺

Nickel can be present in industrial waste water. It occurs as the divalent ion or as a nickel complex.

Reaction basis:

In ammonia solution nickel ions react with diacetyldioxime after oxidation with bromine to form a reddish-brown dye. Insoluble nickel compounds (e.g. nickel cyanide, nickel carbonate) and the nickel cyano complexes are not determined.

VISOCOLOR® ECO Nickel

REF 931 040

Refill pack

REF 931 240

Type: colorimetric test kit
Range: 0 · 0.1 · 0.2 · 0.3 · 0.5 · 0.7 · 0.9 ·
1.2 · 1.5 mg/L Ni²⁺

Sufficient for: 150 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1+9)



Nitrate

NO₃⁻

Nitrates occur in most ground and surface waters in concentrations of up to 20 mg/L. In addition to mere geological influences, nitrate concentrations can also increase due to agricultural sources (fertilisers). The VISOCOLOR® test kits are intended for the determination of nitrate in surface and drinking water and in industrial waste waters which do not contain high concentrations of interfering ions.

Reaction basis:

Nitrate is reduced to nitrite with an inorganic reducing agent. Nitrite is then diazotised with an aromatic amine and simultaneously coupled to form an azo dye.

VISOCOLOR® alpha Nitrate

REF 935 065

Type: colorimetric test kit
Range: 2 · 8 · 15 · 30 · 50 mg/L NO₃⁻
Sufficient for: 100 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

VISOCOLOR® ECO Nitrate

REF 931 041

Refill pack

REF 931 241

Type: colorimetric test kit
Range: 0 · 1 · 3 · 5 · 10 · 20 · 30 · 50 · 70 · 90 ·
120 mg/L NO₃⁻

Sufficient for: 110 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

Test kits for water analysis

Description of individual parameters and tests

Nitrite

NO₂⁻

In surface waters nitrite ions are generally present in low concentrations. Their presence in ground water is less common. In waste waters nitrite frequently occurs, even in fairly high concentrations.

Reaction basis:

Sulfanilamide/sulfanilic acid is diazotized by nitrite in acidic solution. The diazonium salt is coupled with a naphthylamine to form an intensively colored azo dye.

VISOCOLOR® alpha Nitrite

REF 935 066

Type: colorimetric test kit
 Range: 0.05 · 0.10 · 0.25 · 0.5 · 1.0 mg/L
 NO₂⁻
 Sufficient for: 200 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes

VISOCOLOR® ECO Nitrite Refill pack

REF 931 044
 REF 931 244

Type: colorimetric test kit
 Range: 0 · 0.02 · 0.03 · 0.05 · 0.07 · 0.1 ·
 0.2 · 0.3 · 0.5 mg/L NO₂⁻
 Sufficient for: 120 tests
 Shelf life: at least 1.5 years
 Sea water suitability: yes



VISOCOLOR® HE Nitrite Refill pack

REF 920 063
 REF 920 163

Type: highly sensitive test kit
 Range: 0.0 · 0.005 · 0.010 · 0.015 · 0.02 ·
 0.03 · 0.04 · 0.06 · 0.08 · 0.10 mg/L
 NO₂⁻
 Sufficient for: 150 tests
 Shelf life: at least 2 years
 Sea water suitability: yes

Oxygen

O₂

The solubility of oxygen in water depends on the temperature, the pressure and other water components. The oxygen content of water at the time of sampling is often quoted as the percentage of possible saturation.

Reaction basis:

Oxygen determination according to Winkler: in alkaline solution dissolved oxygen oxidises manganese(II) ions to higher-valent manganese hydroxides. In a strongly acidic medium these form manganese(III) ions which can be determined either titrimetrically or colorimetrically after addition of a color reagent.

VISOCOLOR® ECO Oxygen Refill pack

REF 931 088
 REF 931 288

Type: colorimetric test kit
 Range: 0 · 1 · 2 · 3 · 4 · 6 · 8 · 10 mg/L O₂
 Sufficient for: 50 tests
 Shelf life: at least 1 year
 Sea water suitability: yes

When ordering this test kit for the first time, you also need an oxygen bottle, REF 915 498

VISOCOLOR® HE Oxygen SA 10 Refill pack

REF 915 009
 REF 915 209

Type: titration test kit,
 according to DIN EN 25 813
 Range: 0.2–10 mg/L O₂
 1 gradation mark = 0.2 mg/L
 Sufficient for: about 100 tests with an average oxygen content of 9 mg/L
 Shelf life: at least 1.5 years
 Sea water suitability: yes



In combination with the BOD₅ accessories package (REF 916 918) and the BOD₅ nutrient mixture without N-allylthiourea (ATU) (REF 918 994) or the BOD₅ nutrient mixture Plus with ATU (REF 918 995) this test kit can also be used for determination of the BOD₅ (sufficient for 25–50 samples). Preparation of the samples is performed using the so-called dilution principle according to DIN ISO 1899-1-H51.

Test kits for water analysis

Description of individual parameters and tests

pH value

pH

The pH value indicates whether a water reacts acidic, alkaline or neutral. It is determined by the concentration of hydrogen ions. All biological processes in water are tied to specific pH ranges. For municipal and industrial applications, too, the control of specific pH limits is important since e.g. the efficiency of sewage plants or the corrosive potential of tap water on pipes depend in the pH value. Contrary to pH indicator papers, **VISOCOLOR®** pH test kits can also be used to determine accurate pH values in unbuffered sample solutions.

Reaction basis:

A special mixture of indicator dyes shows a characteristic color for every pH value within the range of the kit.

The favorable ratio between sample volume and amount of indicator minimizes the indicator error (acid-base-error). This allows reliable pH measurements in weakly buffered solutions as well. High contents of neutral salts and colloids as well as organic solvent concentrations above 10% can cause wrong results.

VISOCOLOR® alpha pH 5–9 REF 935 075

Type: colorimetric test kit
Range: pH 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0
Sufficient for: 200 tests
Shelf life: at least 3 years
Sea water suitability: yes

VISOCOLOR® ECO pH 4.0–9.0 REF 931 066 Refill pack REF 931 266

Type: colorimetric test kit
Range: pH 4.0 · 5.0 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0
Sufficient for: 450 tests
Shelf life: at least 3 years
Sea water suitability: yes

VISOCOLOR® ECO pH 6.0–8.2 REF 931 270

Type: reagent set for photometric determination
Range: pH 6.0–8.2
Sufficient for: 150 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

A visual colorimetric determination is not possible.

VISOCOLOR® HE pH 4.0–10.0 REF 920 074 Refill pack REF 920 174

Type: highly sensitive test kit
Range: pH 4.0 · 5.0 · 5.5 · 6.0 · 6.5 · 7.0 · 7.5 · 8.0 · 8.5 · 9.0 · 10.0
Sufficient for: 500 tests
Shelf life: at least 2 years
Sea water suitability: yes

For the determination of the pH value, see also Swimming pool page 69

Phosphate

PO₄³⁻

The phosphate content in surface water has direct consequences for its ability to support the growth of certain organisms. Since increasing quantities of phosphates are being fed through domestic waste waters into rivers and lakes, these waters have a tendency towards eutrophication. Exact data about the phosphate content are important for boiler water and feed water. Precise dosing of phosphates in these waters can inhibit formation of boiler scale. Pyro-, meta- and polyphosphates are not determined with **VISOCOLOR®** test kits. The determination of total phosphate requires a decomposition prior to the test.

Reaction basis:

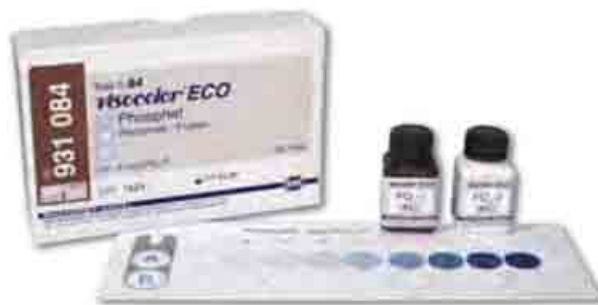
Ammonium molybdate reacts with phosphate ions to form phosphomolybdic acid which is reduced to molybdenum blue (Reaction basis according to DIN EN ISO 6878-D11).

VISOCOLOR® alpha Phosphate REF 935 079

Type: colorimetric test kit
Range: 2 · 5 · 10 · 15 · 20 mg/L PO₄³⁻
Sufficient for: 70 tests
Shelf life: at least 2 years
Sea water suitability: yes

VISOCOLOR® ECO Phosphate REF 931 084 Refill pack REF 931 284

Type: colorimetric test kit
Range: 0 · 0.2 · 0.3 · 0.5 · 0.7 · 1 · 2 · 3 · 5 mg/L PO₄-P
Sufficient for: 90 tests
Shelf life: at least 3 years
Sea water suitability: yes



VISOCOLOR® HE Phosphate REF 920 082 Refill pack REF 920 182

Type: highly sensitive test kit
Range: 0.0 · 0.05 · 0.10 · 0.15 · 0.20 · 0.3 · 0.4 · 0.6 · 0.8 · 1.0 mg/L P
Sufficient for: 300 tests
Shelf life: at least 2 years
Sea water suitability: yes

Test kits for water analysis

Description of individual parameters and tests

VISOCOLOR® HE Phosphate (DEV) REF 920 080
Refill pack REF 920 180

Type: highly sensitive test kit
 Range: 0.0 · 0.01 · 0.02 · 0.03 · 0.05 · 0.07 · 0.10 · 0.15 · 0.20 · 0.25 mg/L P
 Sufficient for: 100 tests
 Shelf life: at least 2 years
 Sea water suitability: yes



Phosphonate

PO_x

Phosphonates are used as complexing agents for softening process and cooling water. They can be determined with **NANOCOLOR® NanOx Metal** and **VISOCOLOR® ECO Phosphate**. Please ask for our special instructions.

Potassium

K⁺

The natural potassium content in ground water is generally about 1–2 mg/L K⁺. Higher values may indicate faecal contaminations, but can also originate from potassium fertilizers. For the growth of plants and animals, potassium is an essential factor. Especially in agriculture the determination of potassium therefore gains increasing importance.

Reaction basis:

Potassium reacts with sodium tetraphenylborate to form a precipitate. Under defined conditions this turbidity can be used for concentration measurements.

Turbidities interfere and have to be filtered prior to the test. Good reproducibility is obtained for drinking, surface and ground water. For polluted waste waters low potassium values may be measured.

VISOCOLOR® ECO Potassium REF 931 032
Refill pack REF 931 232

Type: turbidity test kit
 Range: 2 · 3 · 4 · 6 · 8 · 10 · 15 mg/L K⁺
 Sufficient for: 60 tests
 Shelf life: at least 3 years
 Sea water suitability: yes, after dilution (1+1)

Residual hardness

°e

see hardness (total and residual), page 62

Silica/silicon

SiO₂

Natural water contains silica in different amounts, depending on the geological conditions. The silica occurs partly as soluble silicate, partly colloidal as polysilicic acids. The silica content in water for medium and high pressure boilers may not exceed certain limits. Therefore, in power plants constant measurement of the silica content is required.

Reaction basis:

In acidic solution soluble silica or silicates react with ammonium molybdate to form yellow silicomolybdic acid, which is reduced to silico-molybdenum blue with a reducing agent. (Reaction basis according to DIN EN ISO 16264-H57).

VISOCOLOR® ECO Silica REF 931 033
Refill pack REF 931 233

Type: colorimetric test kit
 Range: 0 · 0.2 · 0.4 · 0.6 · 1.0 · 1.5 · 2.0 · 2.5 · 3.0 mg/L SiO₂

Sufficient for: 80 tests
 Shelf life: at least 3 years
 Sea water suitability: yes

VISOCOLOR® HE Silicon REF 920 087
Refill pack REF 920 187

Type: highly sensitive test kit
 Range: 0.0 · 0.01 · 0.02 · 0.03 · 0.05 · 0.07 · 0.10 · 0.15 · 0.20 · 0.30 mg/L Si

Sufficient for: 120 tests
 Shelf life: at least 2 years
 Sea water suitability: yes



Test kits for water analysis

Description of individual parameters and tests

Sodium



About 2.43 % of the uppermost crust of the earth, with a thickness of 16 km, consist of chemically bonded sodium. It is the 6th most abundant element on our planet. In rocks and minerals it is mostly present as silicate (e.g. soda feldspar or albite) and as sodium chloride (rocksalt), but also as carbonate, nitrate (especially chile salpeter) and cryolite as well as in many other minerals. Each ton of sea water contains an average of 27 kg common salt (10.6 kg sodium), so, sodium makes up for 77 % of all salts present in sea water. Under the assumption, that in natural waters beside sodium mainly calcium and magnesium can occur as cations, it is easily possible to determine the sodium content using *VISOCOLOR*[®] titration test kits. Please ask for the respective special instructions.

Sulfate



The determination of sulfate ions is of special importance to evaluate the aggressiveness of a water towards concrete. Sulfate, a component of natural water, is formed in many manufacturing processes and is found in waste waters even after neutralization.

Reaction basis:

Sulfate reacts with barium ions forming a precipitate of barium sulfate. Under defined conditions this turbidity can be used for concentration measurements.

Turbidities of the sample interfere and have to be filtered. Good reproducibility is obtained for drinking, surface and ground water. For polluted waste waters low concentrations are measured.

VISOCOLOR[®] ECO Sulfate

REF 931 092

Refill pack

REF 931 292

Type: turbidity test kit
Range: 25 · 30 · 35 · 40 · 50 · 60 · 70 · 80 · 100 · 120 · 150 · 200 mg/L SO_4^{2-}
Sufficient for: 100 tests
Shelf life: at least 3 years
Sea water suitability: yes, after dilution (1:50)

Sulfide



In water sulfides can be present as dissolved hydrogen sulfide or as hydrosulfide or sulfide ions.

Reaction basis:

N,N-Dimethyl-1,4-phenylene diamine reacts with hydrogen sulfide to form an unstable compound which rearranges to leucomethylene blue. Oxidation with iron(III) ions yields methylene blue.

VISOCOLOR[®] ECO Sulfide

REF 931 094

Refill pack

REF 931 294

Type: colorimetric test kit
Range: 0.1 · 0.2 · 0.3 · 0.4 · 0.5 · 0.6 · 0.7 · 0.8 mg/L S^{2-}
Sufficient for: 90 tests
Shelf life: at least 3 years
Sea water suitability: yes



VISOCOLOR[®] ECO Sulfate

REF 931 092

Refill pack

REF 931 292

Type: turbidity test kit
Range: 25 · 30 · 35 · 40 · 50 · 60 · 70 · 80 · 100 · 120 · 150 · 200 mg/L SO_4^{2-}
Sufficient for: 100 tests
Shelf life: at least 3 years
Sea water suitability: yes, after dilution (1:50)

Sulfite



Sulfite ions are not present in natural, unpolluted waters, however they often appear in large quantities in industrial waste waters (e.g. paper mills, dye works).

Reaction basis:

Titrimetric determination by addition of iodine solution and reverse titration of unused iodine with sodium thiosulfate.

Oxidizing and reducing substances interfere.

VISOCOLOR[®] ECO Sulfite

REF 931 095

Type: titration test kit
Range: 1 drop = 1 mg/L SO_3^{2-}
Sufficient for: 60 tests with an average Sulfite concentration of 10 mg/L SO_3^{2-}
Shelf life: at least 1 year
Sea water suitability: yes

VISOCOLOR[®] HE Sulfite SU 100

REF 915 008

Refill pack

REF 915 208

Type: titration test kit
Range: 2–100 mg/L SO_3^{2-}
1 gradation mark = 2 mg/L
Sufficient for: 100 tests with an average Sulfite content of 100 mg/L SO_3^{2-}
Shelf life: at least 3 years
Sea water suitability: yes

Test kits for water analysis

Description of individual parameters and tests

Swimming pool

Cl₂ | pH

Chlorination of water in swimming pools with chlorine or chlorine compounds takes place within certain limits. One distinguishes between free chlorine and bound chlorine (chloramines); the sum of both is called total chlorine. The content of free chlorine should be between 0.3 and 0.6 mg/L. Chlorination alters the pH value of the swimming pool water. The ideal pH value is pH 7.4. This prevents formation of malodorous pollutants and irritants to the mucous membrane, and prevents damage to the water treatment system.

Reaction basis:

Free chlorine reacts with *N,N*-diethyl-1,4-phenylene diamine (DPD) to form a red-violet dye. The pH value is determined with phenol red as indicator.

For test kits for the determination of chlorine alone see VISOCOLOR® Chlorine (see page 59)

VISOCOLOR® ECO Swimming pool Refill pack

REF 931 090
REF 931 290

Type: colorimetric test kit
Range: < 0.1 · 0.2 · 0.3 · 0.4 · 0.6 · 0.9 · 1.2 · 2.0 mg/L Cl₂
pH 6.9 · 7.2 · 7.4 · 7.6 · 7.8 · 8.2
Sufficient for: 150 tests each
Shelf life: at least 1.5 years
Sea water suitability: yes

Zinc

Zn²⁺

Zinc is one of the most often used metals for surface finishing. Its content in waste water from e.g. electroplating companies has to be monitored regularly.

Reaction basis:

At a pH of 8.5–9.5 zinc ions react with zincon to form a color complex. Acidic, alkaline and buffered samples have to be adjusted to pH 9 for the test.

VISOCOLOR® ECO Zinc Refill pack

REF 931 098
REF 931 298

Type: colorimetric test kit
Range: 0 · 0.5 · 1 · 2 · 3 mg/L Zn²⁺
Sufficient for: 120 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+9)



visocolor®

Reagent cases

Combinations of different **VISOCOLOR®** test kits

Reagent cases for all purposes

- Rugged cases with premium foam inlays
- Pre-packed or empty cases for individual solutions
- With and without photometer PF-12

MACHEREY-NAGEL reagent cases are flexible tools for all areas of water and soil analysis. The cases are ideal for testing water bodies, for fish farming and a wide variety of other

applications within the area of environmental management and water monitoring.

The reagent cases enable users to get results fast and directly at the point of interest. Previous chemical knowledge or experience is not required to run any of the tests or to use the cases effectively.

The cases include all necessary test instructions and analytical accessories for especially easy and convenient handling.

Ordering information

Type	For the determination of	REF
Reagent case for soil analysis		
<i>VISOCOLOR®</i> reagent case for soil analysis*	Phosphate, potassium, nitrogen (ammonium, nitrite and nitrate), pH, soil structure, incl. all requisite equipment and accessories	931 601
Reagent case for schools		
<i>VISOCOLOR® SCHOOL</i> *	Ammonium, nitrate, nitrite, phosphate, pH, total hardness	933 100
Reagent case for water analysis · without photometer		
<i>VISOCOLOR® ECO</i> reagent case*	Ammonium, carbonate hardness, total hardness, nitrate, nitrite, pH, phosphate	931 301
<i>VISOCOLOR® ECO</i> reagent case, empty	For individual combination of up to 8 test kits of type <i>VISOCOLOR® ECO</i>	931 303
<i>VISOCOLOR®</i> reagent case*	Alkalinity, ammonium, total hardness, nitrite, pH, phosphate, oxygen, temperature	931 304
<i>VISOCOLOR®</i> reagent case, empty	For combination with products from the Rapid Tests and the <i>VISOCOLOR®</i> lines	931 305
Reagent case for water analysis · with photometer PF-12		
Reagent case "Environmental analysis"*	Ammonium, carbonate hardness, iron, total hardness, nitrate, nitrite, pH, phosphate, incl. photometer PF-12	914 303
<i>VISOCOLOR®</i> reagent case with PF-12	For combination with products from the Rapid Tests and the <i>VISOCOLOR®</i> lines	914 301
* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.		

Soil analysis made easy

- Easy sample preparation
- Fast evaluation of nutrients in soil
- Convenient and reliable determination even in the field

VISOCOLOR® reagent case for soil analysis REF 931 601

Thorough analysis is a corner stone to support and maintain healthy, productive and biologically active soil. To effectively and efficiently plan all measures that affect the soil (fertilization, liming, etc.) it is crucial to determine the important soil parameters first. The *VISOCOLOR®* reagent case for soil analysis is the perfect companion for economical, fast and convenient soil analysis, both in the field or in your laboratory, including the following tests:

QUANTOFIX® test strips:

- Ammonium 10–400 mg/L NH_4^+
- Nitrate / Nitrite 10–500 mg/L NO_3^- / 1–80 mg/L NO_2^-

VISOCOLOR® ECO test kits:

- Potassium 2–15 mg/L K^+

VISOCOLOR® HE test kits:

- Phosphate 1–20 mg P/100 g
- pH 4.0–10.0

pH-Fix test strip

- pH 2.0–9.0

New design!



Depending on the parameter to be determined, the soil extracts are prepared with Calcium-Acetate-Lactate (CAL) or with CaCl_2 solution. If required by national regulations or because of local geological conditions, the *VISOCOLOR®* reagent case for soil analysis can also be used with other extraction solutions.

Soil analysis in no time

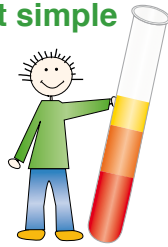
- Manual with background information
- Ideal combination of test papers and colorimetric test kits
- Incl. additional analytical tools, such as scale, sieve etc.

In addition to the reagent case, various *VISOCOLOR®* reagents can also be used for soil analysis. Please request information about suitable extraction solutions.

Combinations of different VISOCOLOR® test kits

Water analysis – it's that simple

- Easy test procedures
- Safe results
- Flexible applications
- Incredible value



NEW!



VISOCOLOR® SCHOOL reagent case REF 933 100

The VISOCOLOR® SCHOOL reagent case is especially designed for schools and caters to the needs of both students and teachers. All reagents are approved to be used in schools in Germany (GUV-SR 2004 directive) and can be disposed of easily just down the drain without any harm to the environment.

VISOCOLOR® SCHOOL reagents:

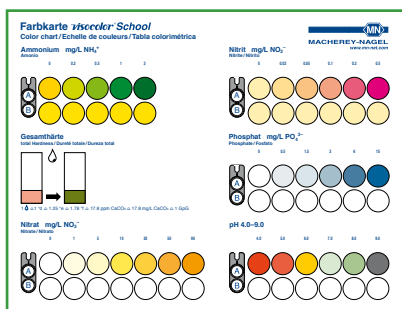
Ammonium	0.2–3 mg/L NH ₄ ⁺
Nitrate	1–90 mg/L NO ₃ ⁻
Nitrite	0.02–0.5 mg/L NO ₂ ⁻
Phosphate	0.5–15 mg/L PO ₄ ³⁻
pH	4.0–9.0
Total hardness	1 drop \triangleq 17.8 mg/L CaCO ₃

The newly developed tests are based on our proven VISOCOLOR® system and were developed as high quality VISOCOLOR® SCHOOL test specifically for schools.

Great features – incredible price

- Maximum safety due to exact labeling of all reagents
- Safe results using color and turbidity compensation
- High sensitivity down to the values of German drinking water standards
- Safe for the environment and easy disposal of used tests

High accuracy



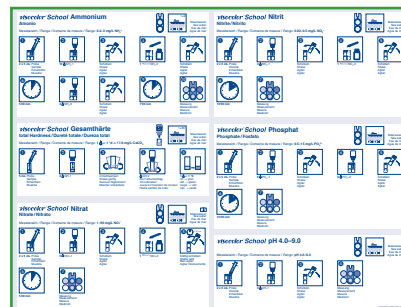
- Color matching with all-in-one color scale
- Compensation of turbidity and colors
- Reaction principles based on international standards

Ordering information

Type	REF
VISOCOLOR® SCHOOL refill pack*	933 200
VISOCOLOR® SCHOOL color chart	933 300
VISOCOLOR® SCHOOL manual (German/English)	933 150

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Simple and safe



- Easy test procedures with pictogram instructions
- Color-coded reagent bottles
- No additional accessories required

Extensive manual



- Background information about the parameters
- Declaration of the reaction basis as well as reaction equation
- Data about interferences

Optionally, the case can be equipped with a pack of pH-Fix or QUANTOFIX® test strips as well.

Reagent cases

Combinations of different *VISOCOLOR*[®] test kits

Reagent cases for water analysis without photometer

- Easy to handle mini-lab
- For exact and accurate determination
- Expandable with one additional *VISOCOLOR*[®] *ECO* test
- Compact case for extensive analysis
- Highly sensitive *VISOCOLOR*[®] *HE* tests included
- Infinite options

VISOCOLOR[®] *ECO* reagent case

REF 931 301

For mobile use with test instructions for visual determination, analytical accessories and the following tests:

VISOCOLOR[®] *ECO* test kits:

Ammonium	0.2–3 mg/L NH ₄ ⁺
Carbonate Hardness	1 drop \triangleq 1.25 °e
total Hardness	1 drop \triangleq 1.25 °e
Nitrate	1–120 mg/L NO ₃ ⁻
Nitrite	0.02–0.5 mg/L NO ₂ ⁻
pH	pH 4.0–9.0
Phosphate	0.2–5 mg/L P

VISOCOLOR[®] reagent case

REF 931 304

For mobile use with test instructions for colorimetric and titrimetric determinations with *VISOCOLOR*[®] tests, analytical accessories as well as the following test kits:

VISOCOLOR[®] *ECO* test kits:

Ammonium 3	0.2–3 mg/L NH ₄ ⁺
Nitrite	0.02–0.5 mg/L NO ₂ ⁻
Phosphate	0.2–5 mg/L P
pH 4.0–9.0	pH 4.0–9.0

VISOCOLOR[®] *HE* test kits:

Alkalinity AL 7	0.2–7.0 mmol/L
total Hardness H 20 F	0.6–25.0 °e
Oxygen SA 10	0.2–10.0 mg/L O ₂



VISOCOLOR[®] *ECO* reagent case, empty REF 931 303

The empty *VISOCOLOR*[®] *ECO* reagent case allows the case to be equipped in an individual and highly flexible way with 8 different *VISOCOLOR*[®] *ECO* test kits.

In addition to the colorimetric and titrimetric *VISOCOLOR*[®] *ECO* tests the reagent case can be equipped with *VISOCOLOR*[®] *ECO* turbidity tests for potassium, cyanuric acid and sulphate as well. Furthermore the cases can be equipped with the *VISOCOLOR*[®] *ECO* Oxygen test including the necessary oxygen flask.

VISOCOLOR[®] reagent case, empty REF 931 305

The empty *VISOCOLOR*[®] reagent case enable you to freely combine every combination of *VISOCOLOR*[®] tests, pH indicator papers, pH-Fix test strips, qualitative test papers and semi-quantitative QUANTOFIX[®] test strips.

Additionally, the case can be equipped with *VISOCOLOR*[®] *ECO* turbidity tests for potassium, cyanuric acid and sulfate as well as with the *VISOCOLOR*[®] *ECO* or *VISOCOLOR*[®] *HE* Oxygen test including oxygen flask.

Combinations of different VISOCOLOR® test kits

Reagent cases with photometer PF-12

- The all-rounder for any purposes
- Increased accuracy and reproducibility
- Infinite options

VISOCOLOR® reagent case “Environmental analysis”

REF 914 303

Reagent case with photometer PF-12 (see page 74) incl. instrument manual, VISOCOLOR® ECO test instructions as well as test instructions for titration test kits, analytical accessories and the following test kits:

VISOCOLOR® ECO test kits:

Ammonium 15	0.5–15 mg/L NH ₄ ⁺
Iron	0.04–1.0 mg/L Fe
Nitrate	1–120 mg/L NO ₃ ⁻
Nitrite	0.02–0.5 mg/L NO ₂ ⁻
Phosphate	0.2–5 mg/L P
pH 4.0–9.0	pH 4.0–9.0

VISOCOLOR® HE test kits:

Carbonate hardness C 20	0.6–25.0 °e
total Hardness H 20 F	0.6–25.0 °e



VISOCOLOR® reagent case with PF-12, without test kits

REF 914 301

The premium foam inlays of the empty VISOCOLOR® reagent case with PF-12 allow the case to be equipped in an individual and highly flexible way with every combination of the VISOCOLOR® tests as well as pH indicator papers, pH-Fix test strips, qualitative test papers and semi-quantitative QUANTOFIX® test strips.

Customized case solutions

Catering to individual customer needs is of the great importance to MACHEREY-NAGEL. Even though our case solutions already provide a high level of flexibility, we recognize that some customers may have specific requirements outside our existing case solutions. Therefore, we offer entirely individual solutions with a foam inlay designed exactly to your specifications and testing needs. Starting at a minimum of 50 cases, we can provide you with a case that perfectly fits your personal requirements. In addition to a special inlay, we also offer readily packed cases starting at a minimum quantity of 50 cases as well.

Thus, within our highly flexible case range, we can provide virtually any customer with the perfect testing and transportation solution.

For a case solution for test strip and test papers without VISOCOLOR® test kits, see page 46.



Photometer for water analysis

Compact photometer PF-12

Maximum flexibility

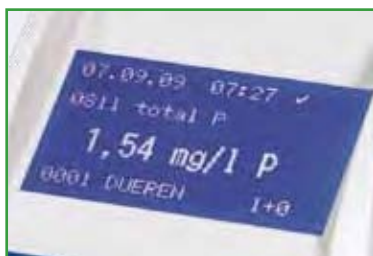
- More than 100 preprogrammed methods
- Automatic wavelength adjustment
- Backlit graphic display with intuitive userguidance
- Data storage according to GLP
- USB interface for data transfer, update and power supply

Experience flexibility

The compact photometer PF-12 is the logical result of a further development based on our very successful photometer PF-11. Adapted to our customers' requirements the PF-12 impresses with modern design and precise analytics. Pre-programmed tests, automatic wavelength adjustment and the intuitive userguidance allow fast and easy operation. Results are stored according to GLP and transferred safely to your PC with the included PC-software. The PF-12 features an unrivaled flexibility with variable power supply via mains supply, standard and rechargeable batteries, PC and 12 V car adapter. Additionally, the PF-12 offers photometric analysis of *VISOCOLOR*[®] *ECO* tests and *NANOCOLOR*[®] tube tests including all relevant parameters for water and waste water analysis and individual combination of tests in the new reagent cases.

Save time

Backlit graphic display with self-explanatory userguidance



- All tests and menu items can be activated fast and easily
- Operation without complex and time-consuming training

Results within seconds

The progressively designed optics is insensitive to external light and makes measuring straightforward

Be prepared for the future

Fast photometer update—free of charge

- At any time, stay up-to-date with our easy online software update
- For current software updates please visit www.mn-net.com



Assure results

Documentation of results according to GLP

- Individual entries of sample number, sample location and dilution

Clear memory management

- GLP-conform storage of results with all supplementary information such as date, time, sample number, sample location and dilution
- Fast and easy access to stored results and data sets

Convenient data export



- *NANOCOLOR*[®] Software DVD included in delivery
- Easy transfer of results to PC
- Data export directly to MS Excel
- Recording of calibration curves to program user-defined methods

Internal quality control according to ISO 9001

- Fulfill supervisor and authority requirements
- Fast and easy self-monitoring of photometric accuracy with *NANOCONTROL* *NANOCHECK* (REF 925 701)

Photometer for water analysis

Compact photometer PF-12

Be mobile

Works under any condition

- Variable power supply for mobile use:



Standard and rechargeable batteries for more than 2000 off the line measurements

- Power saving auto-off function after 5, 10, 15 or 20 min
- Waterproof housing (IP 67)



USB adaptor (REF 919 220) for cigarette lighter in the car



USB adaptor for mains supply in the lab

Enjoy versatility

Complete water and waste water analysis

- Ammonium, Chlorine, total N, total P, Nitrate, Nitrite, all COD tests and many more
- More than 100 preprogrammed tests
 - VISOCOLOR® ECO tests
 - NANOCOLOR® tube tests
- Programmable for 10 user-defined methods
- Photometric basic functions: absorbance, transmission, factor and standard



Endless opportunities

Individual mini-labs

- Portable reagent cases with photometer PF-12
- Photometric analysis of VISOCOLOR® ECO tests can be combined with:



Qualitative test papers, VISOCOLOR® reagent bottles,



QUANTOFIX® test strips, pH-Fix test strips, pH indicator papers



and accessories

Please find further information and examples of reagent cases with photometer PF-12 on page 73.



Photometer for water analysis

Compact photometer PF-12

Technical data

Type:	Filter photometer with microprocessor control, self-test and auto-calibration Wavelength range 340–860 nm
Optics:	Automatic filter wheel with 7 interference filters Insensitive to external light–no light shield required
Wavelengths:	345 / 436 / 470 / 540 / 585 / 620 / 690 nm plus 1 compartment for an additional filter
Wavelength accuracy:	± 2 nm, bandwidth at half transmission 10–12 nm
Light source:	Tungsten lamp
Detector:	Silicon photodiode
Blank value:	Automatic
Measuring modes:	Over 100 preprogrammed tests (<i>NANOCOLOR</i> [®] tube tests and <i>VISOCOLOR</i> [®] <i>ECO</i> tests) Absorbance, transmission, factor, standard 10 freely programmable methods
Photometric range:	± 3 E
Photometric accuracy:	± 1 %
Stability:	< 0.002 E/h
Cuvette holder:	Round tubes 16 mm OD
Data memory:	200 results, GLP conform
Display:	Backlit graphic display, 64 x 128 pixels All important data at a glance: Result in respective unit, date, time, sample number, sample location and dilution
Operation:	Display userguidance, plastic foil keyboard Test selection via test number or parameter lists 12 languages (de, en, fr, es, it, nl, hu, pl, pt, cz, id, si)
Quality Control:	With <i>NANOCONTROL</i> <i>NANOCHECK</i>
Interface:	USB 2.0
Update:	Via Internet / PC, free of charge
Operating range:	0–50 °C, up to 90 % relative humidity
Power supply:	Via USB power supply, standard or rechargeable batteries
Housing:	Waterproof, IP 67
Dimensions:	215 x 100 x 65 mm
Weight:	0.7 kg
Warranty:	2 years

CE This device complies with the following directives:
- 2006/95/EG - Low-Voltage Directive
- 2004/108/EG - EMC-Directive

Ordering information

Description	REF
Compact photometer PF-12 Incl. software DVD, manual, 4 batteries, 4 empty test tubes, funnel, beaker, syringe, USB cable, calibration cuvette and certificate in rugged case	919 200
Accu pack	919 201
USB power supply	919 220
Charger	919 221



Photometer for water analysis

Compact photometer PF-12

VISOCOLOR® ECO and NANOCOLOR® tests which can be evaluated with the PF-12

Ordering information

Test	Ranges	Test no	Wavelength	No of tests	REF
VISOCOLOR® ECO					
Ammonium 3*	0.1–2.5 mg/L NH ₄ ⁺	5-08	690	50	931 208
Ammonium 15*	0.5–8.0 mg/L NH ₄ ⁺	5-10	585	50	931 210
Chloride*	1–60 mg/L Cl ⁻	5-18	470	90	931 218
Chlorine 2, free + total	0.10–2.00 mg/L Cl ₂	5-15	540	150	931 215
free Chlorine 2	0.10–2.00 mg/L Cl ₂	5-16	540	150	931 216
Chlorine 6, free + total	0.05–6.00 mg/L Cl ₂	5-17	540	200	931 217
free Chlorine 6	0.05–6.00 mg/L Cl ₂	5-19	540	400	931 219
Chlorine dioxide*	0.20–3.80 mg/L ClO ₂	5-21	540	150	931 221
Chromium(VI)*	0.04–1.00 mg/L CrO ₄ ²⁻	5-20	540	140	931 220
Copper	0.1–5.0 mg/L Cu ²⁺	5-37	585	100	931 237
Cyanide*	0.01–0.20 mg/L CN ⁻	5-22	585	100	931 222
Cyanuric acid*	10–100 mg/L Cya	5-23	540	100	931 223
Fluoride	0.1–2.0 mg/L F ⁻	5-27	585	150	931 227
Hydrazine*	0.05–0.40 mg/L N ₂ H ₄	5-30	436	130	931 230
Iron 1*	0.10–2.00 mg/L Fe	5-25	540	200	931 225
Iron 2	0.04–2.00 mg/L Fe	5-26	540	100	931 226
Manganese*	0.1–5.0 mg/L Mn ²⁺	5-38	436	70	931 238
Nickel*	0.1–5.0 mg/L Ni ²⁺	5-40	470	150	931 240
Nitrate*	1–80 mg/L NO ₃ ⁻	5-41	436	110	931 241
Nitrite	0.02–0.50 mg/L NO ₂ ⁻	5-44	540	120	931 244
Oxygen*	1–8 mg/L O ₂	5-88	540	50	931 288
pH 6.0–8.2	pH 6.0–8.2	5-70	436/540	150	931 270
Phosphate*	0.2–5.0 mg/L PO ₄ -P 0.6–15 mg/L PO ₄ ³⁻	5-84	690	80	931 284
Potassium*	2–25 mg/L K ⁺	5-32	690	60	931 232
Silica	0.2–3.0 mg/L SiO ₂	5-33	690	80	931 233
Sulfate*	20–200 mg/L SO ₄ ²⁻	5-92	436	100	931 292
Sulfide*	0.05–0.80 mg/L S ₂ ⁻	5-94	620	90	931 294
Zinc	0.1–3.0 mg/L Zn ²⁺	5-98	620	120	931 298
NANOCOLOR® tube tests					
Aluminum 07	0.02–0.70 mg/L Al ³⁺	0-98	540	19	985 098
Ammonium 3	0.04–2.30 mg/L NH ₄ -N 0.05–3.00 mg/L NH ₄ ⁺	0-03	690	20	985 003
Ammonium 10	0.2–8.0 mg/L NH ₄ -N 0.2–10 mg/L NH ₄ ⁺	0-04	690	20	985 004
Ammonium 50	1–40 mg/L NH ₄ -N 1–50 mg/L NH ₄ ⁺	0-05	690	20	985 005
Ammonium 100	4–80 mg/L NH ₄ -N 5–100 mg/L NH ₄ ⁺	0-08	585	20	985 008
Ammonium 200	30–160 mg/L NH ₄ -N 40–200 mg/L NH ₄ ⁺	0-06	585	20	985 006
AOX 3*	0.1–3.0 mg/L AOX 0.01–0.30 mg/L AOX	0-07	470	20	985 007
BOD ₅ *	0.5–12.0 mg/L O ₂	8-22	470	25-50	985 822
BOD ₅ -TT*	0.5–7.5 mg/L O ₂	8-25	436	11-21	985 825
Cadmium 2	0.05–2.00 mg/L Cd ²⁺	0-14	540	10-19	985 014
Carbonate hardness 15	1.0–18.0 °e 0.4–5.4 mmol/L H ⁺	0-15	436/585	20	985 015
Chloride 50*	0.5–50.0 mg/L Cl ⁻	0-21	470	20	985 021
Chloride 200*	5–200 mg/L Cl ⁻	0-19	470	20	985 019
* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.					

visocolor®

Photometer for water analysis

Compact photometer PF-12

visicolor®

Test	Ranges	Test no	Wavelength	No of tests	REF
Chlorine/Ozone 2*	0.05–2.50 mg/L Cl ₂ 0.05–2.00 mg/L O ₃	0-17	540	20	985 017
Chlorine dioxide 5	0.15–5.00 mg/L ClO ₂	0-18	540	20	985 018
Chromate 5	0.05–2.00 mg/L Cr(VI) 0.1–4.0 mg/L CrO ₄ ²⁻	0-24	540	20	985 024
COD 40*	2–40 mg/L O ₂	0-27	345	20	985 027
COD 60*	5–60 mg/L O ₂	0-22	345	20	985 022
COD 160*	15–160 mg/L O ₂	0-26	436	20	985 026
COD 160 Hg-free*	15–160 mg/L O ₂	0-26	436	20	963 026
COD 300*	50–300 mg/L O ₂	0-33	436	20	985 033
COD 600*	50–600 mg/L O ₂	0-30	620	20	985 030
COD 1500*	100–1500 mg/L O ₂	0-29	620	20	985 029
COD 4000*	400–4000 mg/L O ₂	0-11	620	20	985 011
COD 10000*	1.00–10.00 g/L O ₂	0-23	620	20	985 023
COD 15000*	1.0–15.0 g/L O ₂	0-28	620	20	985 028
COD 60000*	5.0–60.0 g/L O ₂	0-12	620	20	985 012
org. Complexing agents 10 (Screeningtest)	0.5–10.0 mg/L IBiC	0-52	540	10–19	985 052
Copper 7	0.10–7.00 mg/L Cu ²⁺	0-54	585	20	985 054
Cyanide 08*	0.02–0.80 mg/L CN ⁻	0-31	585	20	985 031
DEHA 1 (Diethylhydroxylamine)	0.05–1.00 mg/L DEHA	0-35	540	20	985 035
Ethanol 1000	0.10–1.00 g/L EtOH	8-38	620	23	985 838
Fluoride 2	0.1–2.0 mg/L F ⁻	0-40	620	20	985 040
Formaldehyde 8*	0.1–8.0 mg/L HCHO	0-41	585	20	985 041
Formaldehyde 10	0.20–10.00 mg/L HCHO	0-46	436	10–19	985 046
Hardness 20	1.25–25.0 °e 5–50 mg/L Mg ²⁺ 0.2–3.6 mmol/L 10–100 mg/L Ca ²⁺	0-43	540	20	985 043
HC 300* (hydrocarbons)	0.5–5.6 mg/L HC 30–300 mg/kg HC	0-57	436	20	985 057
Iron 3*	0.10–3.00 mg/L Fe	0-37	540	20	985 037
Lead 5*	0.10–5.00 mg/L Pb ²⁺	0-09	540	20	985 009
Manganese 10*	0.1–10.0 mg/L Mn ²⁺	0-58	470	20	985 058
Methanol 15	0.2–15.0 mg/L MeOH	8-59	620	23	985 859
Molybdenum 40*	1.0–30.0 mg/L Mo (VI) 1.6–50.0 mg/L MoO ₄	0-56	345	20	985 056
Nickel 7*	0.10–7.00 mg/L Ni ²⁺	0-61	470	20	985 061
Nitrate 8*	0.30–8.00 mg/L NO ₃ -N 1.3–35.0 mg/L NO ₃ ⁻	0-65	345	20	985 065
Nitrate 50*	0.3–22.0 mg/L NO ₃ -N 2–100 mg/L NO ₃ ⁻	0-64	345	20	985 064
Nitrate 250*	4–60 mg/L NO ₃ -N 20–250 mg/L NO ₃ ⁻	0-66	345	20	985 066
Nitrite 2	0.003–0.460 mg/L NO ₂ -N 0.02–1.50 mg/L NO ₂ ⁻	0-68	540	20	985 068
Nitrite 4	0.1–4.0 mg/L NO ₂ -N 0.3–13.0 mg/L NO ₂ ⁻	0-69	540	20	985 069
total Nitrogen TN _b 22*	0.5–22.0 mg/L N	0-83	345	20	985 083
total Nitrogen TN _b 60*	3–60 mg/L N	0-92	345	20	985 092
total Nitrogen TN _b 220*	5–220 mg/L N	0-88	345	20	985 088
Organic acids 3000*	30–3000 mg/L CH ₃ COOH 0.5–50.0 mmol/L CH ₃ COOH	0-50	470	20	985 050
Oxygen 12*	0.5–12.0 mg/L O ₂	0-82	436	22	985 082
Peroxide 2	0.03–2.00 mg/L H ₂ O ₂	8-71	620	10–19	985 871

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Photometer for water analysis

Compact photometer PF-12

Test	Ranges	Test no	Wavelength	No of tests	REF
pH 6.5-8.2	pH 6.5–8.2	0-72	436/540	100	918 72
Phenolic index 5	0.2–5.0 mg/L Phenol	0-74	470	10–19	985 074
Potassium 50*	2–50 mg/L K ⁺	0-45	690	20	985 045
ortho and total Phosphate 1	0.05–1.50 mg/L P 0.2–5.0 mg/L PO ₄ ³⁻	0-76	690	19	985 076
ortho and total Phosphate 5*	0.20–5.00 mg/L P 0.5–15.0 mg/L PO ₄ ³⁻	0-81	690	19	985 081
ortho and total Phosphate 15*	0.30–15.00 mg/L P 1.0–45.0 mg/L PO ₄ ³⁻	0-80	690	19	985 080
ortho and total Phosphate 45*	5.0–50.0 mg/L P 15–150 mg/L PO ₄ ³⁻	0-55	690	19	985 055
ortho and total Phosphate 50*	10.0–50.0 mg/L P 30–150 mg/L PO ₄ ³⁻	0-79	436	19	985 079
POC 200 (polyoxylcarboxylic acids)	20–200 mg/L	0-70	436	20	985 070
residual Hardness 1	0.03–1.25 °e 0.004–0.180 mmol/L	0-84	540	20	985 084
Silver 3	0.20–3.00 mg/L Ag ⁺	0-49	620	20	985 049
Starch 100	5–100 mg/L starch	0-85	540	19	985 085
Sulfate 200*	10–200 mg/L SO ₄ ²⁻	0-86	436	20	985 086
Sulfate 1000*	200–1000 mg/L SO ₄ ²⁻	0-87	436	20	985 087
Sulfide 3*	0.05–3.00 mg/L S ²⁻	0-73	620	20	985 073
Sulfite 10*	0.2–10.0 mg/L SO ₃ ²⁻	0-89	436	20	985 089
Sulfite 100*	5–100 mg/L SO ₃ ²⁻	0-90	470	19	985 090
Surfactants: Anionic surfactants 4*	0.20–4.00 mg/L MBAS	0-32	620	20	985 032
Surfactants: Cationic surfactants 4*	0.20–4.00 mg/L CTAB	0-34	620	20	985 034
Surfactants: Nonionic surfactants 15*	0.3–15.0 mg/L Triton® X-100	0-47	620	20	985 047
Thiocyanate 50*	0.5–50.0 mg/L SCN ⁻	0-91	470	20	985 091
TOC 25*	2.0–25.0 mg/L TOC	0-93	585	10	985 093
TOC 60	10–60 mg/L TOC	0-94	585	10	985 094
TOC 600*	40–600 mg/L TOC	0-99	585	10	985 099
TTC/Sludge activity 150*	5–150 µg TPF 0.050–2.300 E	8-90	470	20	985 890
Zinc 4*	0.10–4.00 mg/L Zn ²⁺	0-96	620	20	985 096

* This product contains harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

NANOCOLOR®



The system for photometric water analysis

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The system for photometric water analysis

NANOCOLOR® photometer

For universal use in water and waste water analysis

Save time

- Fast measurements by NANOCOLOR® barcode technology
- Preprogrammed tests and photometric basic functions
- Simple measurements without cuvette slot cover
- Clear display of all significant data and functions on the user-friendly touch screen

Experience precision

- Highly accurate measurements by high-quality optical components
- Self-explanatory user guidance
- Safe test procedures with test instructions presented as pictograms

Meet specifications

- Internal quality control in accordance to ISO 9001
- Documentation of results in accordance to GLP
- Clear memory management
- Convenient export of data and professional data and spectrum processing with NANOCOLOR® PC software

incl.
PC software

Enjoy flexibility

- Flexible measurements of different cuvettes without adapter
- Free programming of user defined applications
- Fast photometer update - free of charge

NANOCOLOR® heating blocks

For fast and safe sample digestions

Experienced and flexible

- Preprogrammed standard programs for all routine digestions
- Easy to program for user-defined methods
- Performance of all required digestions with only one instrument

Simple and fast

- Very short warm-up times
- Procedure of all routine digestions in only 30 minutes
- Simple operation via symbol keys

Controlled and safe

- Electronic temperature control and fully automatic calibration with the NANOCOLOR® T-Set
- Extra thick safety covers on the surface of the heating blocks as protection against contact
- Electronic protection against excess temperature

Reliable and versatile

- Constant digestion conditions with high temperature stability
- Suitable for all NANOCOLOR® digestion methods



The system for photometric water analysis

NANOCOLOR® tests

User-friendly and precise analysis

Approved

- Reliable and comparable results - The reaction basis of NANOCOLOR® tests is based on internationally approved standard methods like DIN, EN, ISO, EPA and APHA.

Precise

- Easy handling and highest accuracy - All NANOCOLOR® tests contain accurately pre-dosed ready-to-use reagents and calibrated accessories.

Versatile

- The perfect test for every request - For all important parameters in water and waste water analysis, a large number of tests with different ranges is available.

Unique

- No confusion of different tests – Every NANOCOLOR® test box is equipped with a clearly identifiable color coded label.

Tube tests

Easy and fast measurements

- Using NANOCOLOR® bar coded test tubes, the measurement is automatically performed after inserting the cuvette into the cuvette slot.

Maximum safety for the user

- The contact with any dangerous chemicals is avoided because the measurement is performed directly in the test tube.

Standard tests

Highest sensitivity

- The use of rectangular cuvettes with 50 mm optical path allows the detection of minimum amounts of the detectable substance.

Highest accuracy

- The use of a large sample volume guarantees safe and reproducible results.

Accessories and service

The complete analysis from one source

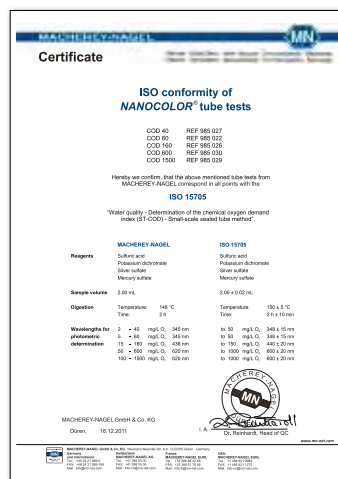
- Wide range of analytical accessories and special chemicals
- Excellent service and technical support

The NANOCONTROL system

Analytical quality control for the complete analytical system

Coverage towards authorities and supervisors

- NANOCOLOR® T-Set
- NANOCONTROL NANOCHECK
- NANOCONTROL NANOTURB
- NANOCONTROL Standards



NANOCOLOR®

The system for photometric water analysis

NANOCOLOR® spectrophotometers

Spectrophotometers NANOCOLOR® UV/VIS and NANOCOLOR® VIS

- High-resolution scans
- Fast measurements
- Self-explanatory user guidance
- Safe processing of data and spectra
- Highest accuracy

Spectrophotometers with reference detector technology (RDT)

NANOCOLOR® spectrophotometers are compact microprocessor-controlled spectrophotometers with monochromator (UV/VIS 190–1100 nm; VIS 340–1100 nm) for universal use in all areas of water and waste water analysis. This includes municipal and industrial waste water, drinking water, process water, surface water, ground water as well as cooling and boiler feed water. The NANOCOLOR® spectrophotometers are also ideal for quality and process control in various industries (e. g. food and beverage).

Save time and make your lab work easier

Fast measurements by NANOCOLOR® barcode technology



- Fully automatic, instant cuvette detection by the built-in laser scanner allows simple and fast routine analysis.
- Selection of the test method and suitable wavelength, the actual measurement and storage of the measurement results are carried out automatically without having to use any other key.

Measurement without cuvette slot cover

- The state-of-the-art optical system is insensitive to external light and allows straightforward measurements

User-friendly touch screen

- All significant data and functions are clearly shown on the colored, backlit touch screen display.

Preprogrammed tests and photometric basic functions

- More than 100 preprogrammed tests with over 200 analysis programs.
- Straightforward call of all photometric basic functions, such as absorbance, transmission, factor, standard and multi-wavelength measurements, as well as kinetics and scan.

Experience precision and increase accuracy

Self-explanatory user guidance

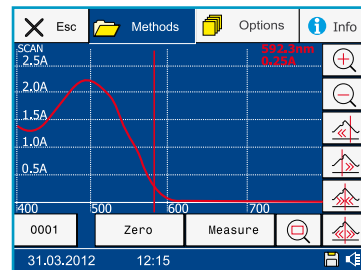
- All tests and menu items can be activated quickly and easily. The photometers can be operated without complex and time-consuming training.

Manual with test instructions, presented as pictograms



- Safe test procedures without complex instructions.

Highly accurate measurements by high-quality optical components

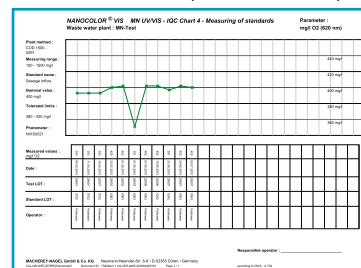


- Precision optics and reference detector technology (RDT) ensure accurate results.
- High resolution scans are recorded and shown on the display within seconds.

Assure results and meet specifications

IQC according to ISO 9001

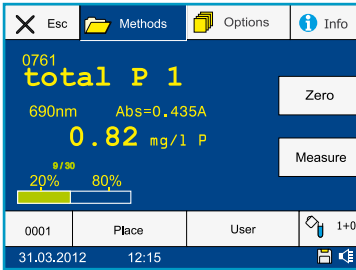
- Conformance to requirements of internal quality control (IQC) and protection towards supervisors and authorities.
- Fast and easy control of photometric accuracy of the NANOCOLOR® spectrophotometers with NANOCONTROL NANOCHECK (REF 925 701) by the user himself.



The system for photometric water analysis

NANOCOLOR® spectrophotometers

Documentation of results according to GLP

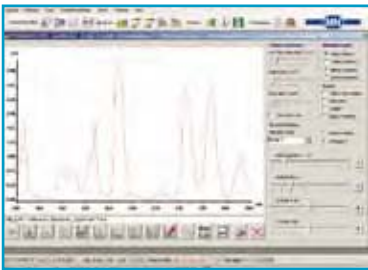


- Individual entries of sample number, sample location, user and dilution.
- Graphic display of the results, relating to the measurement range and the 20–80 % range.

Clear memory management

- GLP-conform storage of the measured results with all supplementary information such as date, time, sample number, sample location, user and dilution.
- Fast and easy access to stored results and data sets.

Convenient export of data



- Easy transfer of measured results and spectra to various common PC formats (e.g. MS Excel).
- Direct print-out of measured data with the NANOCOLOR® thermal printer (REF 919 16).

Professional software for data and spectrum processing included

- Easy processing of transferred data and spectra either with the PC software for NANOCOLOR® spectrophotometers or with standard software.

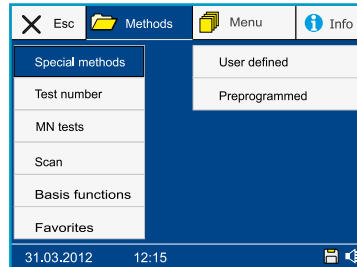
Enjoy flexibility and be prepared for the future

No cuvette adapter required



- Round tubes (16 mm OD) and rectangular cuvettes (2, 10, 20, 40, 50 mm) can be used in the universal cuvette slot without any adapter.
- Small accessories are not required

Programmable for user defined applications



- Free programming of up to 100 user-defined methods
- Within the complete wavelength range

Additional turbidity measurements with 180° transmitted light and 90° scattered light

- Performance of nephelometric turbidity measurements with 90° scattered light for low turbidity values in addition to the 180° transmittance method for high turbidity values.

Fast photometer update – free of charge


- At any time, stay up-to-date with easy software updating via Internet / PC
- For the current software update please visit www.mn-net.com



The system for photometric water analysis

NANOCOLOR® spectrophotometers

Technical data

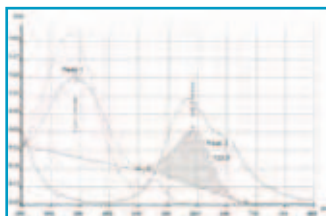
	NANOCOLOR® <i>uv/vis</i>	NANOCOLOR® <i>vis</i>
Type	Spectrophotometer with reference detector technology (RDT)	
Light sources	Halogen lamp (visible range) and deuterium lamp (UV range)	Halogen lamp
Optical system	Monochromator	
Wavelength range	190–1100 nm	340–1100 nm
Wavelength accuracy	± 1 nm	
Wavelength resolution	0.3 nm	
Wavelength calibration	Automatic	
Wavelength selection	Automatic, barcode, manual	
Scan speed	900 nm or 1 complete scan in less than 1 min	
Spectral bandwidth	< 4 nm	
Photometric range	± 3.0 E in wavelength range 200–900 nm	± 3.0 E in wavelength range 400–900 nm
Photometric accuracy	0.005 E at 0.0–0.5 E; 1 % at 0.5–2.0 E	
Photometric linearity	< 0.5 % at 2 E; < 1 % at > 2 E	
Stray light	< 0.1 %	< 0.5 %
Measuring modes	More than 150 preprogrammed tests, 100 optionally programmable methods, absorbance, transmission, factor, kinetics, 2-point calibration, scan, nephelometric turbidity measurement	
Cuvette holder	Test tubes 14 mm ID, rectangular cuvettes 2, 10, 20, 40, 50 mm	
Data memory	1000 measured data sets, GLP conform	
Display	Colored LCD touch screen with background lighting	
Operation	Barcode technology, display user guidance, touch screen	
Languages	DE / EN / FR / ES / IT / PT / NL / PL / HU / CZ	
External light	Intensive, open cuvette slot	
Interfaces	USB and bidirectional serial RS 232	
Update	Via Internet / USB stick	
Operating range	10–40 °C , max. 8 % relative humidity (without condensation)	
Power supply	110–240 V, ~50/60 Hz	12 V DC / 2.0 A
Dimensions L / W / H	390 / 285 / 155 mm	325 / 215 / 115
Weight	6.5 kg	2 kg
Warranty	2 years	
Declaration of conformity:		
 This device complies with the following directives: - 2006/95/EC - Low-Voltage Directive - 2004/108/EC - EMC Directive		

PC software for NANOCOLOR® spectrophotometers • More power for your photometer

- Convenient data export
- Automatic IQC functions
- Clear memory management
- Comprehensive facilities for spectrum analysis
- Data and spectra documentation in accordance to GLP

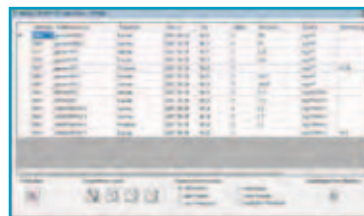
Save time and make your lab work easier

Comprehensive spectrum analysis



- Automatic and manual peak analysis/integration requiring just a few mouse clicks, and an optional smoothing function
- Easy-to-view spectra using grid lines, zero line correction, and multi-color captions
- Detailed display using software-generated or manual scaling and zoom function
- Visual prioritizing of scans that are overlaid

Convenient export of data



- Quick and easy export of measuring data into standard formats such as MS Excel, OpenOffice, XML, and semicolon-separated text
- Data allocation into separate tables according to sampling site, test number, date and user
- Convenient transfer of measuring data to database systems using the XML format

The system for photometric water analysis

NANOCOLOR® spectrophotometers

Meet specifications

Automatic IQC functions

- Forgery-proof generation of GLP-compliant test records
- Integrated testing of wavelength accuracy
- One-click check of UV and VIS lamp performance
- Scattered light test in accordance with DAB and Ph.Eur.
- Software-controlled check of photometric accuracy using NANOCHECK

Experience precision

User-friendly creation of special methods



- PC-administered database for special methods to facilitate easy creation, processing, and administration of your applications
- Convenient creation of special methods with linear and non-linear functions up to the 4th degree
- Direct storing of special methods in your photometer
- Creating and printing GLP-compliant measuring logs with calculated statistical parameters such as variation coefficients etc.

Secure results

Tamper-proof storage of all measured data



- Fully automatic creation of original files to achieve tamper-proof data storage in accordance with FDA 21 CFR Part 11
- Convenient restore function for inadvertently deleted measuring logs
- Secure encrypting of original files

Enjoy flexibility

Using the photometer with your PC

- Controlling the photometer via your PC
- Numerous additional measuring programs such as incorporation of scan kinetics, microbiological functions, multi-wavelength measuring, standard photometric methods
- Storing and exporting scans
- Calculation of spectral absorption coefficients
- Supporting the ANDI spectroscopy standard

System requirements:

Microsoft Windows XP Service Pack 2 or Windows Vista or Windows 7, DVD-Rom drive, USB or RS-232 interface, VGA with at least 1024 x 768 pixels, MS Excel 2003 or later or OpenOffice 3.2

Ordering information

Description	REF	
Spectrophotometers		
Spectrophotometer NANOCOLOR® UV/VIS incl. software DVD, quick reference guide, manual, protective covering, power cable, USB cable, serial cable, calibration cuvette and certificate	919 100	
Spectrophotometer NANOCOLOR® VIS incl. software DVD, quick reference guide, manual, protective covering, power cable, USB cable, serial cable, calibration cuvette and certificate	919 150	NEW!
Accessories		
	NANOCOLOR® UV/VIS	NANOCOLOR® VIS
Manual for NANOCOLOR® spectrophotometers	919 101	
NANOCOLOR® USB stick	919 123	
Handheld scanner for NANOCOLOR® UV/VIS	919 134	
Quarz glass cuvette, 2 mm optical path	919 122	–
Quarz glass cuvette, 10 mm optical path	919 120	–
Quarz glass cuvette, 50 mm optical path	919 121	–
Flow cuvette, Quarz glass, 2 mm optical path	919 127	–
Flow cuvette, Quarz glass, 10 mm optical path	919 126	–
Flow cuvette, Quarz glass, 50 mm optical path	919 129	–
Flow cuvette, glass, 10 mm optical path	919 128	919 158 NEW!
Cover over cuvette slot	919 132	919 152 NEW!
Mains adaptor for NANOCOLOR® VIS	–	919 156 NEW!
External battery pack for NANOCOLOR® VIS, incl. charger	–	919 153 NEW!
Protective covering	919 105	919 155 NEW!
Lamps		
Halogen lamp	919 104	919 154 NEW!
Deuterium lamp	919 103	–
Software		
PC-Software for NANOCOLOR® spectrophotometers	919 102	
More accessories see page 91		

The system for photometric water analysis

Sipper pump for use with **NANOCOLOR®** spectrophotometers

NANOCOLOR® FP-100

- Self-explanatory user guidance
- Variable use of different flow cuvette sizes
- Maximum performance in your lab

Increased measurement speed and time-saving

- For large test series, especially when using rectangular cuvettes
- For special methods
- Simple activating / deactivating via the spectrophotometer

Maximized measurement accuracy

- The same optical conditions for zero and sample
- Proven **NANOCOLOR®** precision


Highest flexibility

- Using multiple cuvette sizes
- Variable pump / rinse and setting times

NEW!



Technical data

Type	Membrane pump to use together with NANOCOLOR® spectrophotometers and NANOCOLOR® software
Display	Status information using 4 LEDs
Operation	Fully automatic via NANOCOLOR® spectrophotometer, alternatively via single-button-operation on the sipper or optional foot switch
Pump capacity	100 mL/min
Protection rating	IP 41
Max. suction lift	3 m water column
Max. pump lift	10 m water column
Interface	RS 232 bi-directional
Dimensions	190 x 130 x 95 mm
Weight	Ca. 550 g
Warranty	2 years
Declaration of conformity:	
 This device complies with the following directives: <ul style="list-style-type: none"> - 2006/95/EC - Low-Voltage Directive - 2004/108/EC - EMC Directive 	

Ordering information

Description	REF
Sipper pump	
Sipper pump NANOCOLOR® FP-100 for NANOCOLOR® spectrophotometers incl. power supply, support stand, tube and intake needle	919 140
Accessories	
RS232 connecting cable for the connection of sipper pump NANOCOLOR® FP-100 and NANOCOLOR® spectrophotometer	919 141
Intake needle for NANOCOLOR® FP-100	919 142
Support stand for NANOCOLOR® FP-100	919 143
Pedal for NANOCOLOR® FP-100	919 144
Mains adaptor for photometer NANOCOLOR® FP-100 / 500 D / 400 D / 350 D / 300 D / 250 D / PT-3 / PF-11 (100–240 V~ to 9 V= /1500 mA)	919 06

The system for photometric water analysis

NANOCOLOR® photometer

NANOCOLOR® 500 D

- Backlit graphic display
- Fastest digital photometer on the market
- In-built battery

User friendliness and safe operations

Future-proof

Adapted to our customers' current and future requirements, the digital photometer NANOCOLOR® 500 D is suitable for universal use in water and wastewater analysis. This includes municipal and industrial wastewater, drinking water, surface water, ground water as well as cooling and boiler water.

NANOCOLOR® Barcode Technology



Fully automatic, instant cuvette detection by the built-in laser scanner allows simple and fast routine analysis. Selection of the test method and suitable wavelength, the actual measurement and storage of the measurement result are carried out automatically without having to use any other key.

Up-to-date data processing

- Large data memory for up to 500 measurement values
 - Automatic storage of all values or user-defined storage of specific values via keypad
 - Memory storage optional
- Traceability of measured values
 - Automatic assignment of date / time for every stored value
 - Optional assignment of sample location / sample number
 - Clear identification of values above or below the measuring range for stored values
- Free selection of individual values by method, sample location, sample number, date and time

Comfortable updating and data processing



- RS 232 C and USB interfaces
- Fast photometer update via Internet / PC
- GLP-compliant measurement documentation on PC or printer
- User-friendly data export software
 - Data transfer in MS Excel / OpenOffice Calc etc.
 - Recording of calibration curves for programming of user defined methods
- Direct print-out on the NANOCOLOR® thermal printer (REF 919 16)



In the field and in the lab

The standard built-in, robust high-performance battery with charge regulator allows continuous operation at 220 V (110 V) and up to 3000 on-site mains-independent measurements. The battery charge status is shown in the graphic display. In the power saving mode, the photometer switches itself off after 10, 20, ... 120 min.

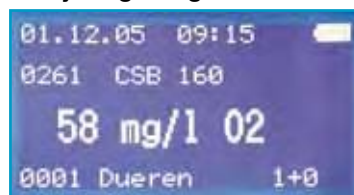
Universal cuvette holder

Round tubes (16 mm OD) and rectangular cuvettes (10, 20 and 50 mm) can be used without adapter.

Versatile – Flexible – Safe

- Over 100 preprogrammed tests with over 200 analysis programmes of MACHEREY-NAGEL
- Programmable for 100 user defined applications, linear and non-linear methods
- Automatic functional test and auto-calibration
- Professional photometric basic functions (extinction, transmission, measurement with factor, kinetics, twopoint calibration)

Everything at a glance



The modern, illuminated graphic display of the NANOCOLOR® 500 D with user guidance shows all important data at a glance.

- Measurement result, displayed directly in the required measuring unit
- Date / time
- Battery charge status
- Sample number (4 characters)
- Sample location (alphanumeric, 12 characters)
- Dilution
- Memory on / off

The system for photometric water analysis

NANOCOLOR® photometer

Technical data

NANOCOLOR® 500 D	
Type	Single beam filter photometer with microprocessor control, self-test and auto-calibration, wavelength range 340–860 nm
Optics	Automatic filter wheel with 10 interference filters
Wavelengths	345 / 365 / 436 / 470 / 520 / 540 / 585 / 620 / 690 / 800 nm plus 2 compartments for additional filters
Wavelength accuracy	± 2 nm, bandwidth at half transmission 10 – 12 nm
Light source	Tungsten lamp
Detector	Silicon photodiode
Blank value	Automatic
Measuring modes	Over 100 preprogrammed tests, 100 freely programmable methods, extinction, transmission, factor, kinetics, two-point calibration
Measuring range	About 3 E, without sign
Photometric accuracy	± 1 %
Stability	<0.002 E/h
Cuvette holder	Round tubes 16 mm OD; rectangular cuvettes 10, 20, 50 mm
Data memory	500 measurement data records, GLP-compliant
Display	Illuminated graphic display with user guidance, 64 x 128 pixels, 12 languages
Operation	Bar code technology, display user guidance, foilcovered push-buttons
Interfaces	USB and bidirectional serial RS 232
Update	Via Internet / PC
Operating range	0–50 °C, up to 90 % relative humidity
Power supply	100–240 V~, 50/60 Hz / 6 V, 3,2 Ah via built-in battery with charge regulator and mains power supply
Dimensions	227 x 282 x 105 mm
Weight	2.4 kg
Warranty	2 years
Declaration of conformity:	
CE This device complies with the following directives: - 2006/95/EC - Low-Voltage Directive - 2004/108/EC - EMC Directive	

NANOCOLOR® software for data export

Data export

The fast availability and safe storage of analytical data with standard software is an important aspect in almost all laboratories. The NANOCOLOR® software for data export offers a direct (“online”) storage of the measurement results (for photometer NANOCOLOR® 500 D, 400 D, Linus, 350 D, 300 D, 250 D). For the photometers specified above, the PF-12 as well as for the luminometer BioFix® Lumi-10 a read-out of the instrument memory (“offline”) with the NANOCOLOR® software for data export is possible.

Data storage



Time	Wavelength	Extinction	Transmittance	Factor	Method
12:00	345 nm	0.123	0.877	1.000	Extinction
12:05	365 nm	0.156	0.844	1.000	Extinction
12:10	436 nm	0.234	0.766	1.000	Extinction
12:15	470 nm	0.312	0.688	1.000	Extinction
12:20	520 nm	0.456	0.544	1.000	Extinction
12:25	540 nm	0.523	0.477	1.000	Extinction
12:30	585 nm	0.678	0.322	1.000	Extinction
12:35	620 nm	0.812	0.188	1.000	Extinction
12:40	690 nm	1.234	0.076	1.000	Extinction
12:45	800 nm	1.567	0.043	1.000	Extinction

With the software you can transfer the data to other software formats for easy and convenient data management, analysis and storage. The software offers the possibility to store the measured data in different formats in order to work on or archive them in other software products. Supported formats include: XLS (Microsoft Excel), XML (data base format), TXT (text file ASCII) and ODS (OpenOfficeCalc)

Recording of calibration curves



The program allows automatic construction of calibration curves up to 4th degree and the calculation of all relevant statistical parameters such as coefficient of variation, standard deviation etc. and the preparation of calibration protocols.

Minimum system requirements

Microsoft Windows XP Service Pack 2 or Windows Vista or Windows 7, DVD-Rom drive, USB or RS-232 interface, VGA with at least 1024 x 768 pixels, MS Excel 2003 or later or OpenOffice 3.2

The system for photometric water analysis

NANOCOLOR® photometer

Ordering information

Description	Pack of	REF
Photometer		
Universal photometer <i>NANOCOLOR</i> ® 500 D incl. software DVD, manual, protective covering, mains adapter, data cable, USB cable and calibration cuvette in stable transport case	1	919 500
Analytical quality control		
<i>NANOCONTROL NANOCHECK</i> , test solutions for the determination of photometric accuracy	1	925 701
Special filters for photometers <i>NANOCOLOR</i>® 500 D/400 D/350 D/300 D/250 D		
Special filters incl. ex factory installation (wavelengths on request)	1	919 850.2
Manuals		
Manual for <i>NANOCOLOR</i> ® 500 D	1	919 501
Cuvettes		
Calibration cuvette for <i>NANOCOLOR</i> ® Photometer	1	916 908
Glass cuvettes, 5 mm optical path	2	919 32
Glass cuvettes, 10 mm optical path	2	919 33
Glass cuvettes, 20 mm optical path	2	919 34
Glass cuvettes, 50 mm optical path	1	919 35
Semi-micro cuvette, 50 mm optical path	1	919 50
Lids for glass cuvettes 10 mm	2	919 41
Lids for glass cuvettes 50 mm	2	919 40
Disposable plastic cuvettes, 10 mm optical path	100	919 37
Lamps		
Tungsten lamp for <i>NANOCOLOR</i> ® 500 D/400 D/350 D/300 D/250 D	1	919 787
Protective coverings		
Protective covering for <i>NANOCOLOR</i> ® 500 D/400 D	1	919 18
Printer		
<i>NANOCOLOR</i> ® thermal printer for <i>NANOCOLOR</i> ® ^{UV/VIS} / ^{VIS} / 500 D / 400 D / 350 D / 300 D / 250 D and PF-11	1	919 16
Cable for <i>NANOCOLOR</i> ® thermal printer for <i>NANOCOLOR</i> ® ^{UV/VIS} / ^{VIS}	1	919 133
Paper for <i>NANOCOLOR</i> ® thermal printer rolls of 58 mm width, core 12 mm, outer diameter 30 mm	5 rolls	930 65
Paper for <i>NANOCOLOR</i> ® thermal printer rolls of 58 mm width, core 12 mm, outer diameter 45 mm	5 rolls	930 71
Software		
<i>NANOCOLOR</i> ® software for data export for <i>NANOCOLOR</i> ® 500 D/400 D/350 D/300 D/250 D and luminometer BioFix® <i>Lumi-10</i>	1 DVD	919 02
Zero modem cable, serial, 2x9 pin SUB-D socket, for <i>NANOCOLOR</i> ® 500 D/400 D/350 D/300 D/250 D and photometer PF-10/PF-11	1	919 680
Adapter, 9 pin SUB-D plug to 25 pin SUB-D socket	1	919 681
Power supply		
Mains adapter for <i>NANOCOLOR</i> ® 500 D/400 D/350 D/300 D/250 D/PF-11; prim. 100–240 V ~; sec. 9 V = / 1500 mA	1	919 06
Rechargeable battery for photometers <i>NANOCOLOR</i> ® 500 D/400 D/350 D	1	919 914

* Additional cable (REF 919 133) is required

The system for photometric water analysis

NANOCOLOR® heating blocks

NANOCOLOR® VARIO 4, VARIO C2 and VARIO HC

Heating blocks of the future

NEW!

- Touch screen with intuitive user guidance
- Lockable protective lids for maximum safety
- USB interfaces for state-of-the-art PC connection
- COD, total N and total P in just 30 minutes
- Internal quality control according to ISO 9001

Experience flexibility

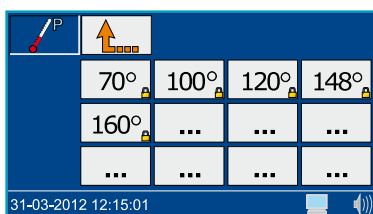
The ideal device for any purpose

NANOCOLOR® VARIO C2 for low sample throughput

NANOCOLOR® VARIO 4 for high sample throughput

NANOCOLOR® VARIO HC for fast sample digestion

Easy programming



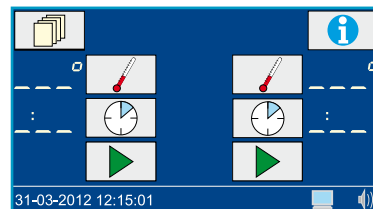
- 7 free memory locations between 4–160 °C (1 °C increments)
- 8 free memory locations between 0h:01min–9h:59min (1min increments)

Suitable for all NANOCOLOR® digestion methods

Application	Temperature	Time
COD (DIN ISO 15705)	148 °C	120 min
High-speed COD	160 °C	30 min
TOC	120 °C	120 min
Total nitrogen	120 °C	30 min
Total phosphorus	120 °C	30 min
Organic acids	100 °C	10 min
Total metals	120 °C	30 min
AOX	120 °C	30 min
Hydrocarbons	148 °C	120 min
Programmable, user-defined programs	40–160 °C	0h:01min – 9h:59min

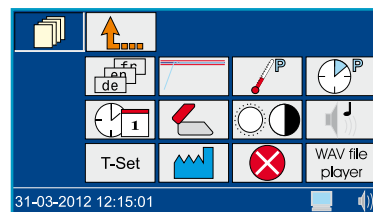
Save time

Standard programs and easy programming



- 5 preprogrammed temperatures 70/100/120/148/160 °C
- 4 preprogrammed heating times 30 min/60 min/120 min/cont.

Self-explanatory user guidance



- User-friendly, bright touch screen
- Operation without time-consuming training
- Quick and easy selection of heating programs
- Convenient input via icons

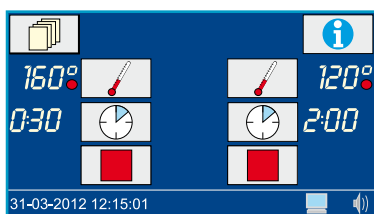


NANOCOLOR®

The system for photometric water analysis

NANOCOLOR® heating blocks

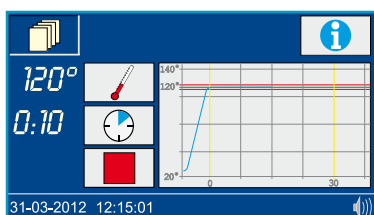
Time-saving procedures



- Extremely short warm-up times (from 20 to 160 °C in just 10 minutes)
- High-speed COD, total nitrogen, total phosphorus and total metals in just 30 minutes

Be safe

Constant digestion conditions



- High temperature stability
- Electronic overheating protection
- Graphic display of heating curves

NANOCOLOR® VARIO 4

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

NANOCOLOR® VARIO C2

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

NANOCOLOR® VARIO HC

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

Maximum safety for the user



- Extra strong safety covers as contact protection (10 mm, replaceable) on the heating block surface
- Lockable protective lids
- Display alert in case of open protective lid

Meet specifications

Internal quality control according to ISO 9001

- Electronic temperature control and fully automatic calibration with the NANOCOLOR® T-Set (REF 919 917)
- Comply with demands of supervisors and authorities
- Heating curves to check temperature stability
- IQC function: Users can check and monitor temperatures as part of their in-house quality control regiment using the NANOCOLOR® T-Set




NANOCOLOR®

The system for photometric water analysis

NANOCOLOR® heating blocks

Technical data

NANOCOLOR® heating blocks	
Type	Programmable heating blocks for chemical-analytical digestions with 24 or 12 bores for test tubes with 16 mm OD (outer diameter) integrated protective lids
Display	Colored, backlit LCD touch screen
Operation	Display menu guidance via touch screen
Temperatures	5 preprogrammed temperatures 70 / 100 / 120 / 148 / 160 °C 7 free memory locations for individual temperature settings
Temperature range	40–160 °C (1 °C increments)
Temperature stability	± 1 °C (according to DIN, EN, ISO and EPA methods)
Warm-up time	from 20 °C to 160 °C within 10 minutes
Heating times	4 preprogrammed heating times 30 min / 60 min / 120 min / cont. 8 free memory locations for individual heating times
Time range	0h:01min–9h:59min (increments 0h:01min)
Safety	Replaceable safety covers as contact protection Lockable protective lids Overheating protection
Interfaces	Bidirectional serial RS 232, USB A (master) and USB B (slave)
Analytical quality control	With NANOCOLOR® T-Set (REF 919 917) optional fully automatic calibration and preparation of test certificates for instrument control and monitoring according to ISO 9001
Update	Via internet and USB stick
Power supply	110–230 V ~, 50/60 Hz
Power consumption	300 / 550 VA (VARIO 4) 150 / 300 VA (VARIO C2) 150 / 550 VA (VARIO HC)
Dimensions (W x D x H)	290 x 287 x 146 mm (VARIO 4 and VARIO HC) 169 x 282 x 146 mm (VARIO C2)
Weight	approx. 3.2 kg (VARIO 4 and VARIO HC) approx. ca. 2.0 kg (VARIO C2)
Warranty	2 years
Declaration of conformity:	
 This device complies with the following directives: - 2006/95/EC - Low-Voltage Directive - 2004/108/EC - EMC Directive	

Ordering information

Description	Pack of	REF
Heating blocks		
NANOCOLOR® VARIO 4 featuring 2 blocks with separate control, 2 x 12 bores for test tubes 16 mm OD, incl. power cable, 2 separate protective coverings, manual, data cable and software DVD	1	919 300
NANOCOLOR® VARIO C2 12 bores for test tubes 16 mm OD, incl. power cable, protective covering, manual, data cable and software DVD	1	919 350
NANOCOLOR® VARIO HC – with cooling system – 12 bores for test tubes 16 mm OD and ventilator, incl. power cable, protective covering, manual, data cable and software-DVD	1	919 330
Accessories for decomposition in a heating block		
Protective covering for NANOCOLOR® VARIO 4 / VARIO C2 / VARIO HC, transparent	1	919 310
Safety cover sheet for NANOCOLOR® VARIO 4 / VARIO C2 / VARIO HC	1	916 598
Reducing adaptors 16 → 13 mm for NANOCOLOR® heating blocks	8	919 916

The system for photometric water analysis

NANOCOLOR® T-Set

NANOCOLOR® T-Set

Calibrated temperature sensor with electronics for external temperature control, fully automatic calibration and preparation of a test certificate for instrument control and monitoring.

Controlled and safe



- Automatic temperature control and calibration of the heating blocks
- Universal thermometer for external temperature measurements
- Comfortable data transfer via USB or serial interface RS 232
- Easy generation of quality certificates in accordance to GLP with the NANOCOLOR® T-Set software



Operation

- Connect the RS 232 plug of the T-Set to the heating block
- Place the temperature sensor into the small bore located on the safety cover
- Select „T-Set“ in the menu
- Select the respective program

Technical data

Detector	PT 1000 (95 x 4 mm)
Accuracy	± 0.1 °C
Display	via LED-displays of the heating block and the NANOCOLOR® T-Set
Operation	via foil-covered symbol keys of the heating block and the NANOCOLOR® T-Set software
Temperature range	0–200 °C
Temperature stability	± 0.2 °C
Long term stability	± 0.1 °C
Interfaces	bidirectional serial RS 232
Operating range	0–50 °C, up to 90 % relative humidity
Power supply	via RS 232
Power consumption	max. 20 mW
Dimensions	112 mm (length)
Weight	ca. 60 g
Certificate	calibrated against adjusted thermometers
Warranty	2 years

Declaration of conformity:



This device complies with the following directives:
- 2004/108/EC - EMC Directive

Ordering information

Description	Pack of	REF
NANOCOLOR® T-Set for electronic temperature control and calibration of heating blocks NANOCOLOR® VARIO 4, VARIO C2, VARIO HC	1	919 917
Adaptor T-Set 16 mm	1	919 924
Adaptor T-Set 13 mm	1	919 925
USB-serial-Adaptor for heating blocks NANOCOLOR® VARIO 4, VARIO C2 and VARIO HC and NANOCOLOR® T-Set	1	919 926

The system for photometric water analysis

NANOCOLOR® tube tests

The perfect tool for routine analysis in sewage plants and industry

- Round tubes with pre-dosed reagents guarantee maximum safety even when using corrosive or toxic chemicals
- Pre-dosed reagents ensure high measurement accuracy
- Use of freeze-dried reagents by the use of instable chemicals
- Analytical security through high layer thickness (16 mm OD)
- Convenient handling – one tube for both reaction and measurement, no decanting necessary
- Time-saving method for routine analysis and process control



Ordering information

for photometers NANOCOLOR® UV/VIS, VIS, 500 D, 400 D, Linus, 350 D, 300 D, 250 D

Test	Measuring ranges NANOCOLOR® photometers		Wave-lengths	No. of tests	REF
Alcohol, see Ethanol and Methanol					
Aluminum 07	0.02–0.70 mg/L Al ³⁺		540 nm	19	985 098
Ammonium 3	0.04–2.30 mg/L NH ₄ -N	0.05–3.00 mg/L NH ₄ ⁺	690 nm	20	985 003
Ammonium 10	0.2–8.0 mg/L NH ₄ -N	0.2–10.0 mg/L NH ₄ ⁺	690 nm	20	985 004
Ammonium 50	1–40 mg/L NH ₄ -N	1–50 mg/L NH ₄ ⁺	690 nm	20	985 005
Ammonium 100	4–80 mg/L NH ₄ -N	5–100 mg/L NH ₄ ⁺	585 nm	20	985 008
Ammonium 200	30–160 mg/L NH ₄ -N	40–200 mg/L NH ₄ ⁺	585 nm	20	985 006
Anionic surfactants see Surfactants					
AOX 3*	0.1–3.0 mg/L AOX	0.01–0.30 mg/L AOX	470 nm	20	985 007
BOD ₅ * (in Winkler bottles)	2–3000 mg/L O ₂		436 nm	25–50	985 822
BOD ₅ *-TT	0.5–3000 mg/L O ₂		436 nm	22	985 825
Cadmium 2 ¹⁾	0.05–2.00 mg/L Cd ²⁺		520 nm	10–19	985 014
Carbonate hardness 15	1.25–18.75 °e	0.4–5.4 mmol/L H ⁺	436/585 nm	20	985 015
Cationic surfactants see Surfactants					
Chloride 200*	5–200 mg/L Cl ⁻		470 nm	20	985 019
Chloride 50*	0.5–50.0 mg/L Cl ⁻		470 nm	20	985 021
Chlorine / Ozone 2*	0.05–2.50 mg/L Cl ₂	0.05–2.00 mg/L O ₃	540 nm	20	985 017
Chlorine dioxide 5	0.15–5.00 mg/L ClO ₂		540 nm	20	985 018
Chromate 5	0.05–2.00 mg/L Cr(VI) 0.005–0.500 mg/L Cr(VI) ²⁾	0.1–4.0 mg/L CrO ₄ ²⁻ 0.01–1.00 mg/L CrO ₄ ²⁻ ²⁾	540 nm	20	985 024
COD 40*	2–40 mg/L O ₂		345 nm	20	985 027
COD 60*	5–60 mg/L O ₂		345 nm	20	985 022
COD 160*	15–160 mg/L O ₂		436 nm	20	985 026
COD 160* Hg-free	15–160 mg/L O ₂		436 nm	20	963 026
COD 300*	50–300 mg/L O ₂		436 nm	20	985 033
COD 600*	NEW! 50–600 mg/L O ₂		620 nm	20	985 030
COD 1500*	100–1500 mg/L O ₂		620 nm	20	985 029
COD 4000*	NEW! 400–4000 mg/L O ₂		620 nm	20	985 011
COD 10000*	1.00–10.00 g/L O ₂		620 nm	20	985 023
COD 15000*	1.0–15.0 g/L O ₂		620 nm	20	985 028
COD 60000*	5.0–60.0 g/L O ₂		620 nm	20	985 012
Copper 7	0.10–7.00 mg/L Cu ²⁺		585 nm	20	985 054
Cyanide 08*	0.02–0.80 mg/L CN ⁻	0.005–0.100 mg/L CN ⁻ ²⁾	585/605 nm	20	985 031
DEHA 1 (Diethylhydroxylamine)	0.05–1.00 mg/L DEHA		540 nm	20	985 035
Ethanol 1000	0.10–1.00 g/L EtOH	0.013–0.130 Vol. % EtOH	620 nm	23	985 838
Fatty acids see Organic acids					
Fluoride 2	0.1–2.0 mg/L F ⁻		620 nm	20	985 040
Formaldehyde 8*	0.1–8.0 mg/L HCHO		585 nm	20	985 041
Formaldehyde 10	0.20–10.00 mg/L HCHO	0.02–1.00 mg/L HCHO ²⁾	412 nm ⁴⁾	20	985 046
Hardness 20	1.25–25.00 °e 0.2–3.6 mmol/L	5–50 mg/L Mg ²⁺ 10–100 mg/L Ca ²⁺	540 nm	20	985 043
HC 300* (Hydrocarbons)	0.5–5.6 mg/L HC	30–300 mg/kg HC	436 nm	20	985 057
Iron 3*	0.10–3.00 mg/L Fe	0.02–1.00 mg/L Fe ²⁾	540 nm	20	985 037
Lead 5* ¹⁾	0.10–5.00 mg/L Pb ²⁺		520 nm	20	985 009

The system for photometric water analysis

NANOCOLOR® tube tests

Test	Measuring ranges NANOCOLOR® photometers		Wave-lengths	No. of tests	REF
org. Complexing agents 10	0.5–10.0 mg/L IBIC		540 nm	10–19	985 052
Manganese 10*	0.1–10.0 mg/L Mn	0.02–2.00 mg/L Mn ^{1) 2)}	470 nm	20	985 058
Methanol 15	0.2–15.0 mg/L MeOH		620 nm	23	985 859
Molybdenum 40*	1.0–40.0 mg/L Mo(VI)	1.6–65.0 mg/L MoO ₄ ²⁻	345/365 nm	20	985 056
Nonionic surfactants, see Surfactants					
Nickel 7*	0.10–7.00 mg/L Ni ²⁺	0.02–1.00 mg/L Ni ²⁺ ^{1) 2)}	470 nm	20	985 061
Nitrate 8*	0.30–8.00 mg/L NO ₃ -N	1.3–35.0 mg/L NO ₃ ⁻	365 nm	20	985 065
Nitrate 50*	0.3–22.0 mg/L NO ₃ -N	2–100 mg/L NO ₃ ⁻	365/385 nm	20	985 064
Nitrate 250*	4–60 mg/L NO ₃ -N	20–250 mg/L NO ₃ ⁻	365/385 nm	20	985 066
Nitrite 2	0.003–0.460 mg/L NO ₂ -N	0.02–1.50 mg/L NO ₂ ⁻	540 nm	20	985 068
Nitrite 4	0.1–4.0 mg/L NO ₂ -N	0.3–13.0 mg/L NO ₂ ⁻	540 nm	20	985 069
total Nitrogen TN _b 22*	0.5–22.0 mg/L N		365/385 nm	20	985 083
total Nitrogen TN _b 60* NEW!	3–60 mg/L N		365 nm	20	985 092
total Nitrogen TN _b 220*	5–220 mg/L N		365/385 nm	20	985 088
Organic acids 3000*	30–3000 mg/L CH ₃ COOH	0.5–50.0 mmol/L CH ₃ COOH	470 nm	20	985 050
Oxygen 12*	0.5–12.0 mg/L O ₂		436 nm	22	985 082
Ozone, see Chlorine / Ozone 2					
Peroxide 2	0.03–2.00 mg/L H ₂ O ₂		620 nm	10–19	985 871
pH 6.5–8.2 ³⁾	pH 6.5–8.2		436/540 nm	100	918 72
Phenolic index 5 ¹⁾	0.2–5.0 mg/L Phenol		520 nm	20	985 074
ortho and total Phosphate 1	0.05–1.50 mg/L P 0.010–0.800 mg/L P ^{1) 2)}	0.2–5.0 mg/L PO ₄ ³⁻ 0.03–2.50 mg/L PO ₄ ³⁻ ^{1) 2)}	690 nm	20	985 076
ortho and total Phosphate 5*	0.20–5.00 mg/L P		690 nm	20	985 081
ortho and total Phosphate 15*	0.30–15.00 mg/L P		690 nm	20	985 080
ortho and total Phosphate 45*	5.0–50.0 mg/L P		690 nm	20	985 055
ortho and total Phosphate 50*	10.0–50.0 mg/L P		436 nm	19	985 079
POC 200	20–200 mg/L POC		436 nm	20	985 070
Potassium 50*	2–50 mg/L K ⁺		690 nm	20	985 045
Residual hardness 1	0.03–1.25 °e		540 nm	20	985 084
Silver 3	0.20–3.00 mg/L Ag ⁺		620 nm	20	985 049
Starch 100	5–100 mg/L starch		540 nm	19	985 085
Sulfate 200*	10–200 mg/L SO ₄ ²⁻		436 nm	20	985 086
Sulfate 1000*	200–1000 mg/L SO ₄ ²⁻		436 nm	20	985 087
Sulfide 3*	0.05–3.00 mg/L S ²⁻		620 nm	20	985 073
Sulfite 10*	0.2–10.0 mg/L SO ₃ ²⁻	0.05–2.40 mg/L SO ₃ ²⁻ ^{1) 2)}	436 nm	20	985 089
Sulfite 100*	5–100 mg/L SO ₃ ²⁻		470 nm	19	985 090
Anionic surfactants 4*	0.20–4.00 mg/L MBAS		620 nm	20	985 032
Cationic surfactants 4*	0.20–4.00 mg/L CTAB		620 nm	20	985 034
Nonionic surfactants 15*	0.3–15.0 mg/L Triton® X-100		610/620 nm	20	985 047
Tin 3* ¹⁾	0.10–3.00 mg/L Sn		520 nm	18	985 097
Thiocyanat 50*	0.5–50.0 mg/L SCN ⁻		470 nm	20	985 091
TOC 25*	2.0–25.0 mg/L C		585 nm	10	985 093
TOC 60	10–60 mg/L C		585 nm	10	985 094
TOC 600*	40–600 mg/L C		585 nm	10	985 099
TTC / Sludge activity 150*	5–150 µg TPF	0.050–2.300 E	470 nm	20	985 890
Zinc 4*	0.10–4.00 mg/L Zn ²⁺		620 nm	20	985 096

¹⁾ This test cannot be evaluated with the NANOCOLOR® 250 D

²⁾ A more sensitive measuring range is possible by using 50 mm semi-micro cuvettes (REF 919 50)

³⁾ without barcode

⁴⁾ special filter necessary

* These products contain harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

The system for photometric water analysis

NANOCOLOR® standard tests

These test kits contain the necessary chemicals cost-efficiently prepared in individual bottles. To conduct a test, just fill 20 mL test solution into a 25 mL volumetric flask and add the reagents according to the included instructions.

After adding water up to the 25 mL mark, the solution is transferred to a rectangular cuvette for photometric measurement.

Advantages of this application:

- Safe observation of the reaction in the volumetric flask
- Highest precision and high sensitivity due to use of precision cuvettes with 50 mm thickness
- Higher measuring range due to use of different size cuvettes (10–50 mm)
- Measuring range can be enhanced easily by dilution in measuring flask
- High number of tests with one test set, especially with diluted test solutions



Product information for photometers NANOCOLOR® UV/VIS, VIS, 500 D, 400 D, Linus and 300 D

These tests cannot be evaluated with the photometer NANOCOLOR® 350 D and 250 D. However, they can still be used with the photometers NANOCOLOR® SM-1, 200 D, 100 D, 50 D, 25, PT-2 and PT-3.

Test	Measuring range NANOCOLOR® photometers		Wavelength	No. of tests ²⁾	REF
Aluminum	0.01–1.00 mg/L Al ³⁺		540 nm	200	918 02
Ammonium*	0.01–2.0 mg/L NH ₄ -N	0.01–2.5 mg/L NH ₄ ⁺	690 nm	100	918 05
Chloride	0.2–125 mg/L Cl ⁻		470 nm	220	918 20
Chlorine*	0.02–10.0 mg/L Cl ₂		540 nm	250	918 16
Chlorine dioxide*	0.04–4.00 mg/L ClO ₂		540 nm	50	918 163
Chromate	0.01–3.0 mg/L Cr(VI)	0.01–6.0 mg/L CrO ₄ ²⁻	540 nm	250	918 25
Cobalt*	0.002–0.70 mg/L Co ²⁺		540 nm	220	918 51
Color (Hazen/DIN) ¹⁾	5–500 mg/L Pt (Hazen)	0.2–20.0 1/m	436 nm	–	Test 1-39
Copper ⁴⁾	0.01–10.0 mg/L Cu ²⁺		585 nm	250	918 53
Cyanide*	0.001–0.50 mg/L CN ⁻		585 nm	250	918 30
Fluoride*	0.05–2.00 mg/L F ⁻		585 nm	200	918 142
Hydrazine*	0.002–1.50 mg/L N ₂ H ₄		436 nm	220	918 44
Iron* ⁴⁾	0.01–15.0 mg/L Fe		470 nm	250	918 36
Manganese ^{*4)}	0.01–10.0 mg/L Mn		470 nm	250	918 60
Nickel* ⁴⁾	0.01–10.0 mg/L Ni ²⁺		436 nm	250	918 62
Nitrate*	0.9–30.0 mg/L NO ₃ -N	4–140 mg/L NO ₃ ⁻	365/385 nm	100	918 65
Nitrate Z*	0.02–1.0 mg/L NO ₃ -N	0.1–5.0 mg/L NO ₃ ⁻	520 nm	440	918 63
Nitrite* ⁴⁾	0.002–0.30 mg/L NO ₂ -N	0.005–1.00 mg/L NO ₂ ⁻	520 nm	220	918 67
Phenol*	0.01–7.0 mg/L Phenol		470 nm	440	918 75
ortho Phosphate*	0.04–6.5 mg/L PO ₄ -P	0.1–20.0 mg/L PO ₄ ³⁻	690 nm	440	918 77
ortho Phosphate* ⁴⁾	0.2–17 mg/L PO ₄ -P	0.5–50 mg/L PO ₄ ³⁻	436 nm	440	918 78
Silica* ⁴⁾	0.01–5.00 mg/L Si	0.02–10.0 mg/L SiO ₂	690 nm	250	918 48
	0.002–0.100 mg/L Si ³⁾	0.005–0.200 mg/L SiO ₂ ³⁾	800 nm		
Sulfide*	0.01–3.0 mg/L S ²⁻		620/660 nm	250	918 88
Turbidity (formazine/DIN) ¹⁾	1–100 TE/F (= FAU)	0.5–40.0 1/m	620/860 nm	–	Test 1-92
Turbidity ^{1) 5)}	1–1000 NTU			–	Test 9-06
Zinc*	0.02–3.0 mg/L Zn ²⁺		620 nm	250	918 95

¹⁾ A NANOCOLOR® standard test is not required. The original sample has to be measured without additional reagents.

²⁾ Maximum number, the actual number of tests depends on the sample volume.

³⁾ High sensitivity measurement

⁴⁾ Simplified procedure in a beaker is possible. Please ask for special instructions!

⁵⁾ Evaluation only possible with NANOCOLOR® UV/VIS and NANOCOLOR® VIS

* These products contain harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Special chemicals for NANOCOLOR® standard tests are described with the individual parameters and tests from page 100.

The system for photometric water analysis

NANOCOLOR® standard tests • extraction methods

Extraction methods are a special type of standard tests:

Some analytical procedures require application of two immiscible phases. By shaking in a separation funnel the color complex is transferred into the organic phase.

This method is used:

- To increase sensitivity when the color intensity is higher in the organic solvent
- To increase selectivity, i. e. only the color complex of the substance in question is soluble in the organic phase while interfering compounds remain in the aqueous phase
- When the color complex formed in the reaction is not soluble in water

The NANOCOLOR® analytical system mainly uses chlorinated hydrocarbons as organic phase which form the lower layer during extraction. Some analytical instructions prescribe two consecutive extractions to increase selectivity and eliminate interferences.



NANOCOLOR® standard tests with extraction methods

These tests cannot be evaluated with the photometer NANOCOLOR® 350 D and 250 D. The reagent sets 918 10, 918 13, 918 32 and 918 34 contain chlorinated hydrocarbons. If national or international legal limitations for the use, storage or shipment of tetrachloromethane must be observed, the reagent sets 918 10 and 918 13 are also available without tetrachloromethane.

Ordering information

Test	Measuring range NANOCOLOR® photometers 500 D, 400 D, Linus, 300 D	Wave-length	No. of tests	REF
Cadmium*	0.002–0.50 mg/L Cd ²⁺	520 nm	25	918 13
Cadmium* (without tetrachloromethane) ¹⁾	0.002–0.50 mg/L Cd ²⁺	520 nm	25	918 131
Detergents anionic*	0.02–5.0 mg/L MBAS	620 nm	40	918 32
Detergents cationic*	0.05–5.0 mg/L CTAB	436 nm	40	918 34
Lead*	0.005–1.00 mg/L Pb ²⁺	520 nm	25	918 10
Lead* (without tetrachloromethane)* ¹⁾	0.005–1.00 mg/L Pb ²⁺	520 nm	25	918 101

¹⁾ The tetrachloromethane required for these tests has to be purchased from a local laboratory shop.

* These products contain harmful substances which must be specially labeled as hazardous. For detailed information please see MSDS.

Special chemicals for these NANOCOLOR® tests are described with the individual parameters and tests from page 100.

Accessories for NANOCOLOR® standard tests

Ordering information

Description	Pack of	REF
Accessories		
Glass cuvettes, 10 mm optical path	2	919 33
Glass cuvettes, 50 mm optical path	1	919 35
Semi-micro cuvette 50 mm for reduced analytical preparations and sensitive measurements	1	919 50
Lids for glass cuvettes 10 mm	2	919 41
Lids for glass cuvettes 50 mm	2	919 40
Disposable cuvettes, plastic, 10 mm optical path	100	919 37
Separation funnel 100 mL, glass, with NS glass tap and polyethylene stopper	2	916 64
Stand with clamps and bosses for 4 separation funnels, height 70 cm	1	916 95

The system for photometric water analysis

Description of individual parameters and tests

Alcohol

see Ethanol, page 107, and Methanol, page 111

Aluminum

Reaction basis:

In weakly acidic solution Aluminum ions react with eriochrome cyanine R to form a red-violet colored complex.

Strongly acidic and buffered samples have to be adjusted to pH 6. Turbid solutions have to be filtered (membrane filters 0.45 µm, REF 916 50).

NANOCOLOR® Aluminum 07

REF 985 098

Type: tube test 0-98
Measuring range: 0.02–0.70 mg/L Al³⁺
Sufficient for: 19 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Aluminum

REF 918 02

Type: standard test 1-02
Measuring range: 0.01–1.00 mg/L Al³⁺
Sufficient for: 200 tests
Shelf life: at least 2 years
Sea water suitability: yes

Ammonium

Reaction basis:

DIN method: At a pH value of about 12.6 ammonium ions react with hypochlorite and salicylate in the presence of sodium nitroprussiate as catalyst to form a blue indophenol.

Good reproducibility is obtained for weakly polluted waters. Heavy pollution causes errors, unless a distillation precedes the analysis. Strongly acidic and buffered samples have to be adjusted to pH 9–10 for the test using sodium hydroxide solution.

NANOCOLOR® Ammonium 3

REF 985 003

Type: tube test 0-03
Measuring range: 0.04–2.30 mg/L NH₄-N
0.05–3.00 mg/L NH₄⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+1)

Al

NANOCOLOR® Ammonium 10

REF 985 004

Type: tube test 0-04
Measuring range: 0.2–8.0 mg/L NH₄-N
0.2–10.0 mg/L NH₄⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Ammonium 50

REF 985 005

Type: tube test 0-05
Measuring range: 1–40 mg/L NH₄-N
1–50 mg/L NH₄⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Ammonium 100

REF 985 008

Type: tube test 0-08
Measuring range: 4–80 mg/L NH₄-N
5–100 mg/L NH₄⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Ammonium 200

REF 985 006

Type: tube test 0-06
Measuring range: 30–160 mg/L NH₄-N
40–200 mg/L NH₄⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Ammonium

REF 918 05

Type: standard test 1-05
Measuring range: 0.01–2.0 mg/L NH₄-N
0.01–2.5 mg/L NH₄⁺
Sufficient for: 100 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR®



The system for photometric water analysis

Description of individual parameters and tests

Anionic surfactants

see Surfactants, page 118

AOX

Reaction basis:

DIN method: Adsorbable organically bound halogens (AOX) is an important sum parameter for the control of water quality. The AOX content represents the sum of organically bound halogens (chlorine, bromine, iodine) which are adsorbable to a suitable adsorbent (Reaction basis similar to DIN 38409-H22).

The pH-value of the sample must be between 3 and 5.

NANOCOLOR® AOX 3

REF 985 007

Type: tube test 0-07
Measuring range: 0.1–3.0 mg/L AOX
0.01–0.30 mg/L AOX
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes, with 200 mL of rinsing solution
For further information about AOX see page 125.



AOX

BOD₅

(Biochemical oxygen demand)

BOD₅

Simple determination of the biochemical oxygen demand after 5 days (BOD₅) of undiluted samples without using a control in accordance with DIN EN 1899-2-H52! The oxygen enriched, undiluted sample is incubated in test tubes for 5 days at 20 ± 1°C in the dark. Determination of the dissolved oxygen after 5 days is based on the Winkler procedure, DIN EN 25813-G21

Reaction basis:

DIN method: the determination of the BOD₅ is carried out with the so-called dilution principle. The oxygen concentration is determined immediately after preparation of the sample and again after a five-day incubation in Winkler-flasks.

Simplified method: Incubation of the sample and oxygen determination after five days are conducted in the same cuvette.

Reaction basis for both methods analogous to DIN EN 1899-1-H51 and DIN EN 25813-G21.

NANOCOLOR® BOD₅

REF 985 822

Type: in Winkler bottles, test 8-22
Measuring range: 2–3000 mg/L O₂
Sufficient for: 25–50 tests
Shelf life: at least 2 years
Sea water suitability: yes

NANOCOLOR® BOD₅-TT

REF 985 825

Type: tube test 8-25
Measuring range: 0.5–3000 mg/L O₂
Sufficient for: 22 tests
Shelf life: at least 2 years
Sea water suitability: yes

For further information about BOD₅, please see page 126.

Bromine

Br₂

Bromine and bromating reagents such as 1,3-dibromo-5,5-dimethylhydantoin (DBH) are used – like chlorine – for disinfecting swimming pool water.

For the determination of bromine you may use all NANOCOLOR® Chlorine tests (see page 103). A factor for conversion is given in the instructions.



The system for photometric water analysis

Description of individual parameters and tests

Cadmium

Reaction bases:

(a) Cadion method: in alkaline solution cadmium ions react with cadion [1-(4-nitrophenyl)-3-(4-phenylazophenyl)-triazene] to form a red color complex, which is evaluated photometrically.

(b) Dithizone method: at a pH > 6 cadmium ions react with dithizone to form primary cadmium dithizonate, which is stable in strongly alkaline medium and dissolves in carbon tetrachloride (tetrachloromethane) highly sensitive with pink color. Interfering heavy metals are removed with dithizone in acidic medium.

NANOCOLOR® Cadmium 2

REF 985 014

Type: tube test 0-14
Reaction basis: (a) Cadion method
Measuring range: 0.05–2.00 mg/L Cd²⁺
Sufficient for: 10–19 tests
Shelf life: at least 1 year
Sea water suitability: yes



NANOCOLOR® Cadmium with tetrachloromethane without tetrachloromethane

REF 918 13
REF 918 131

Type: standard test 1-13
Reaction basis: (b) dithizone method
Measuring range: 0.002–0.50 mg/L Cd²⁺
Sufficient for: 25 tests
Shelf life: at least 1.5 years
Sea water suitability: no

Reagent set 918 13 contains tetrachloromethane. Observe local regulations concerning halogenated hydrocarbons.

Reagent set 918 131 does not contain the required tetrachloromethane which thus has to be purchased separately from a local laboratory store.

Cd

Carbonate hardness (Alkalinity)

CO₃²⁻

Reaction basis:

Photometric determination is performed with bromophenol blue.

NANOCOLOR® Carbonate hardness 15

REF 985 015

Type: tube test 0-15
Measuring range: 1.25–18.75 °e
0.4–5.4 mmol/L H⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes



Cationic surfactants

see Surfactants, page 118

Chloride

Cl⁻

Reaction basis:

Chloride ions react with mercury(II) thiocyanate to form undissociated mercury(II) chloride. The liberated thiocyanate shows a blood-red coloration with iron(III) ions (Reaction basis according to DIN EN ISO 15682-D31).

NANOCOLOR® Chloride 50

REF 985 021

Type: tube test 0-21
Measuring range: 0.5–50.0 mg/L Cl⁻
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® Chloride 200

REF 985 019

Type: tube test 0-19
Measuring range: 5–200 mg/L Cl⁻
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1:200)

NANOCOLOR® Chloride

REF 918 20

Type: standard test 1-20
Measuring range: 0.2–125 mg/L Cl⁻
Sufficient for: 220 tests
Shelf life: at least 1 year
Sea water suitability: no

The system for photometric water analysis

Description of individual parameters and tests

Chlorine/Chlorine dioxide/Ozone



Reaction basis:

DIN EN ISO method: Free chlorine, total chlorine and ozone react with DPD (*N,N*-diethyl-1,4-phenylene diamine) to form a red-violet dye. By defined addition of iodide ions one can distinguish between the individual components (Reaction basis test 0-17 and test 1-16 according to DIN EN ISO 7393-G4-2; test 0-18 and test 1-163 according to DIN 38408-G5).

NANOCOLOR® Chlorine/Ozone 2

REF 985 017

Type: tube test 0-17
Measuring range: 0.05–2.50 mg/L Cl₂
0.05–2.00 mg/L O₃
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Chlorine

REF 918 16

Type: standard tests 1-16
Measuring range: 0.02–10.0 mg/L Cl₂
Sufficient for: 250 tests
Shelf life: at least 3 years
Sea water suitability: yes

NANOCOLOR® Chlorine dioxide 5

REF 985 018

Type: tube tests 0-18
Measuring range: 0.15–5.00 mg/L ClO₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

Chlorine dioxide, like chlorine, reacts with DPD to form a red-violet dye. By using a special supplementary reagent, chlorine dioxide is determined selectively.

NANOCOLOR® Chlorine dioxide

REF 918 163

Type: standard test 1-163
Measuring range: 0.04–4.00 mg/L ClO₂
Sufficient for: 50 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

Chlorine dioxide, like chlorine, reacts with DPD to form a red violet dye. For a simultaneous determination of chlorine, chlorine dioxide and chlorite we recommend the procedure Test 1-164. For an evaluation in accordance with drinking water specifications only the 50-mm rectangular cuvette can be applied.

Chromium/Chromate



Reaction basis:

In acidic medium, chromate ions react with diphenylcarbazide (lyophilised in the tube test) to form a red-violet colored complex. Chromium(III) ions are not determined unless they are converted to Cr(VI) by silver-catalysed oxidation with ammonium peroxodisulfate/sulfuric acid (Reaction basis according to DIN 38 405-D24).

NANOCOLOR® Chromate 5

REF 985 024

Type: tube test 0-24
Measuring range: 0.1–4.0 mg/L CrO₄²⁻
0.05–2.00 mg/L Cr(VI)
when using semi-micro cuvettes (REF 919 50):
0.01–1.00 mg/L CrO₄²⁻
0.005–0.500 mg/L Cr(VI)
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes



NANOCOLOR® Chromate

REF 918 25

Type: standard test 1-25
Measuring range: 0.01–6.0 mg/L CrO₄²⁻
0.01–3.0 mg/L Cr(VI)
Sufficient for: 250 tests
Shelf life: at least 2 years
Sea water suitability: yes

If you need to determine total chromium with the above reagent sets chromate, you require:

NANOCOLOR® NanOx Metal

REF 918 978

Sufficient for: approx. 150 tests
Shelf life: at least 1 year

+ empty reaction tubes 16 mm OD

REF 916 80

Cobalt



Reaction basis:

At a pH > 5 cobalt(II) ions react with 4-[5-chloropyridyl-(2)-azo]-*m*-phenylene diamine (5-Cl-PADAB) to form a pink colored complex which, contrary to other heavy metal complexes, is also stable below pH 5.

NANOCOLOR® Cobalt

REF 918 51

Type: standard test 1-51
Measuring range: 0.002–0.70 mg/L Co²⁺
No. of tests: 220 tests
Shelf life: at least 2 years
Sea water suitability: yes

The system for photometric water analysis

Description of individual parameters and tests

COD (chemical oxygen demand)

COD

Reaction basis:

ISO method:

The chemical oxygen demand of water is determined by silver-catalyzed oxidation with potassium dichromate/sulfuric acid at 148 °C during a two hour period.

Using different chromate concentrations, one can cover different measuring ranges. For COD 40/60/160/300 the color decrease of the yellow dichromate ions is measured.

For COD 600/1500/4000/10000/15000/60000 the color increase of the green chromium(III) ions formed is evaluated.

If the chloride content exceeds 1500 mg/L the sample has to be diluted with COD-free water, or you may use the chloride complexing agent. Lower chloride concentrations are masked by the mercury(II) sulfate present in the test tubes.

The tests 0-27, 0-22, 0-26, 0-29 and 0-30 are in accordance with ISO 15705:2002.

Benefits of NANOCOLOR® tube tests in comparison to ISO 6060:

The new ISO 15705 is based on the same chemical reaction as the established ISO 6060. The water contents are oxidized by sulfuric acid and potassium dichromate in the presence of silver sulfate and mercury(II) sulfate. Compared with the ISO 6060, the new method, described in the ISO 15705 has significant advantages:

- Five times less mercury
- Comparably less other toxic and hazardous reagents
- All reagents are pre-dosed in round tubes
- Reduced risks for the user
- Reproducible results because of photometric determination

NANOCOLOR® COD 40

Type: test tubes 0-27
Measuring range: 2–40 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year at 2–8 °C
Sea water suitability: no

REF 985 027

DIN ISO

NANOCOLOR® COD 60

Type: tube tests 0-22
Measuring range: 5–60 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year at 2–8 °C
Sea water suitability: no

REF 985 022

DIN ISO

The high COD sensitivity of these tests requires a reduced amount of potassium dichromate. This also means that a reduced oxidizing power is present, possibly leading to a low result for the residual COD, which are often the hardest components to be digested.

NANOCOLOR® COD 160

Type: tube test 0-26
Measuring range: 15–160 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

REF 985 026

DIN ISO

NANOCOLOR® COD 160 Hg-free

without use of toxic mercury salts
Type: tube test 0-26
Measuring range: 15–160 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year at 2–8 °C
Sea water suitability: no

REF 963 026

Chloride contents below 2000 mg/L are eliminated by a simple filtration pretreatment step using a special cartridge and do not interfere.

The reliable dichromate chemistry leads to reproducible and comparable results.



The system for photometric water analysis

Description of individual parameters and tests

NANOCOLOR® COD 300

Type: tube test 0-33
Measuring range: 50–300 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® COD 600 **NEW!**

Measuring range: 50–600 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® COD 1500

Type: tube test 0-29
Measuring range: 100–1500 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® COD 4000 **NEW!**

Type: tube test 0-11
Measuring range: 400–4000 mg/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® COD 10000

Type: tube test 0-23
Measuring range: 1.00–10.00 g/L O₂
Sufficient for: 20 test
Shelf life: at least 1 year
Sea water suitability: no

REF 985 033

NANOCOLOR® COD 15000

Type: tube test 0-28
Measuring range: 1.0–15.0 g/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

REF 985 028

REF 985 030

DIN ISO

NANOCOLOR® COD 60000

Type: tube test 0-12
Measuring range: 5.0–60.0 g/L O₂
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

REF 985 012

REF 985 029

DIN ISO

Chloride complexing agent

for COD determinations with chloride concentrations from 1000–7000 mg/L Cl⁻
Sufficient for: 100–200 tests
Shelf life: at least 1.5 years

REF 918 911

REF 985 011

Cartridges for chloride elimination

for removal of up to 2000 mg/L Cl⁻ per cartridge
Pack of: 10 cartridges
Shelf life: at least 1 year at 2–8 °C

REF 963 911

COD-free water

for control of measurements and dilution of water samples

REF 918 993

REF 985 023



NANOCOLOR®

The system for photometric water analysis

Description of individual parameters and tests

Color/Coloration

1/m

Colors occurring in natural waters are usually in the yellow to brown range. Other colors (e. g. in waste water) are not completely covered.

Reaction basis:

For determination of the color intensity one uses the HAZEN scale, which is calibrated with platinum-cobalt chloride standards.

In accordance with DIN EN ISO 7887-C1-3 the coloration is measured as spectral absorption coefficient at 3 wavelengths: 436 nm, ~525 nm, ~620 nm. The color of the pure sample is measured without any reagents. **NANOCOLOR**® photometers are programmed with all necessary calibration data for the above determinations.

Turbidities have to be filtered (membrane filtration kit, REF 916 50). If you also need the turbidity value of your sample, you may calculate it from the difference of a measurement before and another after filtration.

NANOCOLOR® Color

Type: no reagents required; test 1-39

Measuring range: 5–500 mg/L Pt
0.2–20.0 1/m

Sea water suitability: yes

Complexing agents (organic)

IBiC

Reaction basis:

DIN method: Photometric determination of the decoloration of the bismuth-xylenol orange complex

The complexing agents are determined relative to the bismuth complexing index I_{BIC}. The following conversion factors apply:

1 mg/L I_{BIC} \triangleq 1.4 mg/L EDTA (M = 292 g/mol) \triangleq 1.0 mg/L NTA

This method is a screening test which covers strong complexing agents. If the result is positive, metals present in the sample may be partially or completely withdrawn from the photometric determination. In this case a digestion for the analysis of metals (e. g. with Crack set REF 918 08 or **NANOCOLOR**® *NanOx* Metal, REF 918 978) has to precede the photometric measurement (Reaction basis according to DIN 38409-H26).

NANOCOLOR® org. Complexing agents 10 (screening test)

REF 985 052

Type: tube test 0-52

Measuring range: 0.5–10.0 mg/L IBiC

Sufficient for: 10–19 determinations

Shelf life: at least 1 year

Sea water suitability: yes, after dilution (1:20)

Copper

Cu

Reaction basis:

In weakly alkaline solution copper(II) ions react with cupri-zone [oxalic acid bis(cyclohexylidene hydrazide)] to form a blue complex.

NANOCOLOR® Copper 7

REF 985 054

Type: tube test 0-54

Measuring range: 0.10–7.00 mg/L Cu²⁺

Sufficient for: 20 tests

Shelf life: at least 2 years

Sea water suitability: yes



NANOCOLOR® Copper

REF 918 53

Type: standard test 1-53

Measuring range: 0.01–10.0 mg/L Cu²⁺

Sufficient for: 250 tests

Shelf life: at least 2 years

Sea water suitability: yes

Reagents for lime precipitation

REF 918 939

Reagent for eliminating interfering calcium (up to 20 g/L Ca²⁺) for copper, nickel and zinc determinations.

Sufficient for: 20 tests

Shelf life: at least 2 years

Cyanide

CN⁻

Reaction basis:

Cyanide ions react with chloroamine T to form cyanogen chloride which forms a polymethine dye with a pyridine derivative and barbituric acid. The test measures free cyanide and cyanide complexes which can be destroyed with chlorine (Reaction basis test 0-31 analog DIN EN ISO 14403-D6; test 1-30 analog DIN 38405-D13 + D14).

For determination of cyanide which can be easily liberated and for determination of total cyanide please ask for a special instruction from MACHEREY-NAGEL.

The system for photometric water analysis

Description of individual parameters and tests

NANOCOLOR® Cyanide 08

REF 985 031

Type: standard test 0-31
Measuring range: 0.02–0.80 mg/L CN⁻
when using semi-micro cuvettes
50 mm (REF 919 50)
0.005–0.100 mg/L CN⁻
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+3)

NANOCOLOR® Cyanide

REF 918 30

Type: standard test 1-30
Measuring range: 0.001–0.50 mg/L CN⁻
Sufficient for: 250 tests
Shelf life: at least 1 year
Sea water suitability: yes

DEHA (diethylhydroxylamine)

DEHA

In boiler houses the carcinogenic hydrazine is more and more replaced by diethylhydroxylamine (DEHA) to remove oxygen.

Reaction basis:

Measurement of the reduction properties of DEHA for iron(III) ions and photometric determination of the iron(II) ions formed after 15 min heating to 100 °C.

NANOCOLOR® DEHA 1

REF 985 035

Type: standard test 0-35
Measuring range: 0.05–1.00 mg/L DEHA
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

Detergents



see Surfactants, page 118

Ethanol

EtOH

Reaction basis:

The enzyme alcoholoxidase splits ethanol to form acetaldehyde and hydrogen peroxide. The peroxide formed reacts by catalytic oxidation of a chromogen with peroxidase to form a blue dye.

Applicable for spirits, beer and fruit juices. Strong oxidizing agents can cause high results.

NANOCOLOR® Ethanol 1000

REF 985 838

Type: tube test 8-38
Measuring range: 0.10–1.00 g/L EtOH
0.013–0.130 Vol.% EtOH
Sufficient for: 23 tests
Shelf life: at least 2 years at < 0 °C
Sea water suitability: no

Fatty acids

HOAc

see Organic acids, page 113

Fluoride

F⁻

Reaction bases:

(a) Fluoride shifts the color of the lanthanum-alizarin complex to violet. In a buffered solution the color shift can be measured photometrically.

(b) Photometric determination of fluoride ions with 1,8-dihydroxy-2-(4-sulfophenylazo)naphthalene-3,6-disulfonic acid (SPADNS)

NANOCOLOR® Fluoride 2

REF 985 040

Type: tube test 0-40
Reaction basis: (a) method with lanthanum-alizarin complex
Measuring range: 0.1–2.0 mg/L F⁻
Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1+9)



NANOCOLOR® Fluoride

REF 918 142

Type: standard test 1-42
Reaction basis: (b) SPADNS-method
Measuring range: 0.05–2.00 mg/L F⁻
Sufficient for: 200 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after distillation

The system for photometric water analysis

Description of individual parameters and tests

Formaldehyde

HCHO

Formaldehyde has technically been produced for approx. 100 years and is used as raw material for resins, as binding material for wood-based panels (chipboards), for textile treatment, for disinfection and conservation and as raw material for medicinal products and explosives. Particularly in wood and chipboard industry the content of formaldehyde must be determined and threshold values must be observed. Chipboards are the main source for formaldehyde in living spaces.

Chipboards and other wood-based panels, like plywood or blockboards are often glued with binding materials based on formaldehyde which are easy and cheap to produce. To produce these binding materials, formaldehyde is spiked with urea, whereby water is formed, which dries afterwards. This process is reversible, so that during the life-time of such wood-based panels the influence of air humidity leads to a digestion of the binding material to formaldehyde and urea. The resulting formaldehyde gases out from the wood-based panel. This process takes place during the whole service life of the panel, as long as there is binding material in the panel.

The classification of wood-based panels is done with the standardised perforator method (DIN EN 120 – Wood-based panels – Determination of formaldehyde content, Extraction method called the perforator method).

Reaction bases:

(a) Chromotropic acid method: Formaldehyde reacts with chromotropic acid in sulfuric acid solution to form a violet dye.

(b) Acetylacetone method: Formaldehyde reacts with ammonium ions and acetylacetone to a yellow dye.

NANOCOLOR® Formaldehyde 8

REF 985 041

Type: tube test 0-41
Reaction basis: (a) Chromotropic acid method
Measuring range: 0.1–8.0 mg/L HCHO
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Formaldehyde 10

REF 985 046

Type: tube test 0-46
Reaction basis: (b) Acetylacetone method
Measuring range: 0.20–10.00 mg/L HCHO
when using semi-micro cuvettes
50 mm (REF 919 50):
0.02–1.00 mg/L HCHO
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes

The comparability of the results obtained with the tube test NANOCOLOR® Formaldehyde 10 with the results measured with the standardised perforator method according to DIN EN 120 was checked and certified by the eph (Development and test laboratory for wood technology) in Dresden, Germany.

Total hardness

°e

Reaction basis:

Photometric determination of total hardness with phthalein purple.

NANOCOLOR® Hardness 20

REF 985 043

Type: tube test 0-43
Measuring range: 1.25–25.00 °e
5–50 mg/L Mg²⁺
10–100 mg/L Ca²⁺
Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1:30)

With the aid of a selective masking agent differentiation between calcium and magnesium is possible.



NANOCOLOR® residual Hardness 1

REF 985 084

Type: tube test 0-84
Measuring range: 0.03–1.25 °e
0.004–0.180 mmol/L
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

The system for photometric water analysis

Description of individual parameters and tests

Hydrocarbons

HC

Reaction basis:

The determination of hydrocarbons is based on an MN-patented method without halogenated solvents. The extracting agent is *n*-pentane. After removal of polar substances, the extracting agent is evaporated and the test tube with the evaporation residue is connected with a COD test tube via a screwed joint. Finally, the hydrocarbons are oxidized as COD and determined photometrically.

NANOCOLOR® HC 300

REF 985 057

Type: tube test 0-57
Measuring range: 0.5–5.6 mg/L HC
30–300 mg/kg HC
after extraction from water or soil samples
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® HC 300

REF 918 571

Type: Extraktion kit for water samples
Test 0-571
Sufficient for: 20 tests
Shelf life: at least 1.5 years

NANOCOLOR® HC 300

REF 918 572

Type: Extraktion kit for soil samples
Test 0-572
Sufficient for: 20 tests
Shelf life: at least 1.5 years
For a detailed description see page 109.

Hydrazine

N₂H₄

Reaction basis:

DIN method: In acidic solution hydrazine reacts with 4-dimethylaminobenzaldehyde to form a yellow-orange compound.

NANOCOLOR® Hydrazine

REF 918 44

Type: standard test 1-44
Measuring range: 0.002–1.50 mg/L N₂H₄
Sufficient for: 220 tests
Shelf life: at least 1 year
Sea water suitability: yes

Iron

Fe

Reaction bases:

(a) Triazine method: iron(II) ions react with a triazine derivative to form a violet colored complex.

(b) DIN method: iron(II) ions react with 1,10-phenanthroline to form an orange colored complex. This method determines dissolved and easily soluble iron compounds (Reaction basis according to DIN 38406-E1).

For differentiation between total iron and dissolved iron we recommend the following methods:

A: determination of the dissolved iron after filtration with the membrane filtration kit 0.45 µm (REF 916 50)

B: determination of total iron after digestion with NANOCOLOR® NanOx Metal (REF 918 978) or with NANOCOLOR® Crack Set (REF 918 08)

NANOCOLOR® Iron 3

REF 985 037

Type: tube test 0-37
Reaction basis: (a) Triazine method
Measuring range: 0.10–3.00 mg/L Fe
when using semi-micro cuvettes
50 mm (REF 919 50):
0.02–1.00 mg/L Fe

Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes

NANOCOLOR® Iron

REF 918 36

Type: standard test 1-36
Reaction basis: (b) DIN method
Measuring range: 0.01–15.0 mg/L Fe
Sufficient for: 250 tests
Shelf life: at least 3 years
Sea water suitability: yes

A modified test procedure allows the determination of Fe²⁺ ions in the presence of Fe³⁺.



The system for photometric water analysis

Description of individual parameters and tests

Lead

Reaction bases:

(a) PAR method: in the presence of cyanide, lead(II) ions react with 4-[pyridyl-(2-azo)]-resorcinol (PAR) to form a red dye. If interfering heavy metals are present, only the red lead complex is destroyed and the color decrease is measured photometrically.

(b) Dithizone method: at pH 7 to 9 in the presence of cyanide, lead(II) ions react with dithizone to form primary lead dithizonate, which is soluble in carbon tetrachloride with high selectivity yielding a pink solution (extraction method).

NANOCOLOR® Lead 5

REF 985 009

Type: tube test 0-09
Reaction basis: (a) PAR method
Measuring range: 0.10–5.00 mg/L Pb²⁺
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no



NANOCOLOR® Lead with tetrachloromethane without tetrachloromethane

REF 918 10

REF 918 101

Type: standard test 1-10
Reaction basis: (b) Dithizone method
Measuring range: 0.005–1.00 mg/L Pb²⁺
Sufficient for: 25 tests
Shelf life: at least 1.5 years
Sea water suitability: no

Reagent set 918 10 contains tetrachloromethane. Observe local regulations concerning halogenated hydrocarbons.

Reagent set 918 101 does not contain the required tetrachloromethane which thus has to be purchased separately from a local laboratory store.

Lipophilic substances

see Hydrocarbons, page 109 and page 127

Pb

Manganese

Mn

Reaction basis:

In alkaline solution manganese ions react with formaldoxime to form an orange-red complex (according to DIN 38406-E2).

NANOCOLOR® Manganese 10

REF 985 058

Type: tube test 0-58
Measuring range: 0.1–10.0 mg/L Mn when using semi-micro cuvettes 50 mm (REF 919 50): 0.02–2.00 mg/L Mn

Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes



NANOCOLOR® Manganese

REF 918 60

Type: standard tests 1-60
Measuring range: 0.01–10.0 mg/L Mn
Sufficient for: 250 tests
Shelf life: at least 3 years
Sea water suitability: no

HC

The system for photometric water analysis

Description of individual parameters and tests

Methanol

MeOH

Reaction basis:

The enzyme alcoholoxidase splits methanol to form formaldehyde and hydrogen peroxide. The peroxide reacts by catalytic oxidation of a chromogen with peroxidase to form a blue color dye.

Suitable for the analysis of waste water, surface water and drinking water.

NANOCOLOR® Methanol 15

REF 985 859

Type: tube test 8-59
Measuring range: 0.2–15.0 mg/L MeOH
Sufficient for: 23 tests
Shelf life: at least 1 year at < 0 °C
Sea water suitability: no



Nonionic Surfactants



see Surfactants, page 118

Nickel

Ni

Reaction basis:

In alkaline solution nickel ions react with diacetyldioxime after oxidation to form a red-brown dye. Nickel cyanide and nickel cyanocomplexes are not determined. To remove interfering calcium, use the reagents for lime precipitation.

Nickel in complexes will not be detected. For the determination of total Nickel, a digestion with *NANOCOLOR® NanOx Metal* (REF 918 978) or with the digestion kit (REF 918 08) has to be carried out before.

NANOCOLOR® Nickel 7

REF 985 061

Type: tube test 0-61
Measuring range: 0.10–7.00 mg/L Ni²⁺
when using semi-micro cuvettes
50 mm (REF 919 50):
0.02–1.00 mg/L Ni²⁺

Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+9)



Molybdenum

Mo

Reaction basis:

Molybdate ions react with thioglycolic acid to form a yellow color complex. Nitrite interferes with the determination and has to be destroyed with amidosulfuric acid (REF 918 973) prior to the analysis.

NANOCOLOR® Molybdenum 40

REF 985 056

Type: tube test 0-56
Measuring range: 1.0–40.0 mg/L Mo(VI)
1.6–65.0 mg/L MoO₄²⁻
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Nickel

REF 918 62

Type: standard test 1-62
Measuring range: 0.01–10.0 mg/L Ni²⁺
Sufficient for: 250 tests
Shelf life: at least 2 years
Sea water suitability: yes

Reagents for precipitation

REF 918 939

Reagents for elimination of interfering calcium (up to 20 g/L Ca²⁺) for copper, nickel and zinc determinations.

Sufficient for: 20 tests
Shelf life: at least 2 years

The system for photometric water analysis

Description of individual parameters and tests

Nitrate



Reaction bases:

(a) ISO method: in acidic solution nitrate ions react with 2,6-dimethylphenol to form 4-nitro-2,6-dimethylphenol, which can be evaluated photometrically.

Applicable for drinking, ground and weakly polluted surface water (Reaction basis according to DIN 38405-D9-2).

(b) Reduction method: first nitrate ions are reduced to form nitrite ions. In acidic solution these nitrite ions react with sulfanilic acid and 1-naphthylamine to form a red azo dye. Nitrite interferes (elimination with amidosulfuric acid).

NANOCOLOR® Nitrate 8

REF 985 065

Type: tube test 0-65
Reaction basis: (a) ISO method
Measuring range: 0.30–8.00 mg/L $\text{NO}_3\text{-N}$
1.3–35.0 mg/L NO_3^-
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Nitrate 50

REF 985 064

Type: tube test 0-64
Reaction basis: (a) ISO method
Measuring range: 0.3–22.0 mg/L $\text{NO}_3\text{-N}$
2–100 mg/L NO_3^-
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Nitrate 250

REF 985 066

Type: tube test 0-66
Reaction basis: (a) ISO method
Measuring range: 4–60 mg/L $\text{NO}_3\text{-N}$
20–250 mg/L NO_3^-
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Nitrate

REF 918 65

Type: standard test 1-65
Reaction basis: (a) ISO method
Measuring range: 0.9–30.0 mg/L $\text{NO}_3\text{-N}$
4–140 mg/L NO_3^-
when using semi-micro cuvettes
50 mm (REF 919 50):
0.10–2.50 mg/L $\text{NO}_3\text{-N}$
0.50–11.10 mg/L NO_3^-
Sufficient for: 100 tests
Shelf life: at least 2 years
Sea water suitability: no

NANOCOLOR® Nitrate Z

REF 918 63

Type: standard test 1-63
Reaction basis: (b) Reduction method
Measuring range: 0.02–1.0 mg/L $\text{NO}_3\text{-N}$
0.1–5.0 mg/L NO_3^-
Sufficient for: 440 tests
Shelf life: at least 1.5 years
Sea water suitability: no

Amidosulfuric acid

REF 918 973

for elimination of interfering nitrite

Cartridges for chlorine elimination

REF 963 911

One cartridge is sufficient for removal of up to 2000 mg/L Cl^-
Pack of: 10 cartridges
Shelf life: at least 1 year at 2–8 °C

Nitrite



Reaction bases:

(a) DIN EN method: nitrite reacts with sulfanilamide and *N*-(1-naphthyl)-ethylene diamine (lyophilised) to form a red-violet azo dye (Reaction basis according to DIN EN 26777-D₁₀).

(b) Sulfanilic acid method: in acidic solution sulfanilic acid is diazotized with nitrite. The diazonium salt is coupled with 1-naphthylamine to form a red dye.

NANOCOLOR® Nitrite 2

REF 985 068

Type: tube test 0-68
Reaction basis: (a) DIN EN method
Measuring range: 0.003–0.460 mg/L $\text{NO}_2\text{-N}$
0.02–1.50 mg/L NO_2^-
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes



NANOCOLOR® Nitrite 4

REF 985 069

Type: tube test 0-69
Reaction basis: (a) DIN EN method
Measuring range: 0.1–4.0 mg/L $\text{NO}_2\text{-N}$
0.3–13.0 mg/L NO_2^-
Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

NANOCOLOR® Nitrite

REF 918 67

Type: standard test 1-67
Reaction basis: (b) Sulfanilic acid method
Measuring range: 0.002–0.30 mg/L $\text{NO}_2\text{-N}$
0.005–1.00 mg/L NO_2^-
Sufficient for: 220 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

The system for photometric water analysis

Description of individual parameters and tests

Nitrite in cooling lubricants

The reagents for sample preparation allow to prepare nitrite containing samples for photometric measurement using a clarification precipitation (Carrez solutions 1+2).

Reagents for sample preparation by clarification precipitation

REF 918 937

Reagents for removal of emulsions, turbidities and color prior to the test, e. g. for nitrite in cooling lubricants, seepage water from waste deposits etc.

Sufficient for: 30 tests
Shelf life: at least 2 years

Nitrogen (total)

TN_b

Reaction basis:

DIN EN ISO method: all organic and inorganic nitrogen containing substances are oxidized to nitrate in acidic solution. In acidic solution nitrate ions react with 2,6-dimethylphenol to form 4-nitro-2,6-dimethylphenol, which can be evaluated photometrically (Reaction basis according to DIN 38405-D9).

A more detailed description of the digestion in a heating block can be found on page 121.

NANOCOLOR® total Nitrogen TN_b 22

REF 985 083

Type: tube test 0-83
Measuring range: 0.5–22.0 mg/L N
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® total Nitrogen TN_b 60

REF 985 092

Type: tube test 0-92
Measuring range: 3–60 mg/L N
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

NEW!

NANOCOLOR® total Nitrogen TN_b 220

REF 985 088

Type: tube test 0-88
Measuring range: 5–220 mg/L N
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: no

The complete tests contain NANOCOLOR® NanOx N digestion and compensation reagent as well as the corresponding nitrate tube tests.

Organic acids

HOAc

Reaction basis:

The determination of organic acids is carried out in two steps:

1. Esterification of organic acids with ethylene glycol.
2. Conversion of the esters to hydroxamic acids, which subsequently react with iron (III) ions to form red colored complexes, which are determined photometrically.

The concentration of organic acids in waters is affected by biochemical processes. Therefore, the samples have to be determined rapidly after sampling (Reaction basis according to DIN EN 38414-S19).

Turbid solutions have to be filtered before the determination.

Digested sludge must be filtered (e.g. with folded filter MN 617 we, REF 535 018 or membrane filter 0.45 µm, REF 916 50) or centrifuged.

NANOCOLOR® Organic acids

REF 985 050

Type: tube test 0-50
Measuring range: 30–3000 mg/L CH₃COOH
0.5–50.0 mmol/L CH₃COOH

Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

Oxygen

O₂

Reaction basis:

Oxygen reacts with manganese(II) ions and potassium iodide to form an equivalent amount of iodine, which is measured photometrically (Reaction basis according to DIN EN 25813-G21).

Good reproducibility is obtained when the tube test is filled to the brim (without air bubbles) at the sampling location in order to immediately bind the oxygen by chemical reaction. The photometric method thus provides a true alternative to the measurement with electrometric oxygen electrodes.

NANOCOLOR® Oxygen 12

REF 985 082

Type: tube tests 0-82
Measuring range: 0.5–12.0 mg/L O₂
Sufficient for: 22 tests
Shelf life: at least 2 years
Sea water suitability: yes



The system for photometric water analysis

Description of individual parameters and tests

Ozone

see Chlorine, page 103



Peroxide

Reaction basis:

Peroxides react by catalytic oxidation of a chromogen in the presence of peroxidase to form a blue dye.

NANOCOLOR® Peroxide 2

REF 985 871

Type: tube test 8-71
Measuring range: 0.03–2.00 mg/L H₂O₂
Sufficient for: 10–19 tests
Shelf life: at least 1 year at 2–8 °C
Sea water suitability: yes



Phenol/Phenolic index



Reaction bases:

(a) DIN method: photometric determination of phenols and other compounds capable of oxidative coupling, which form antipyrine dyes with 4-aminoantipyrine (Reaction basis according to DIN 38409-H16-3).

Oxidizing substances, reducing substances and cyanides interfere. For turbid waters and sea water analysis an additional extraction with isobutyl methyl ketone (MIBK) is necessary.

(b) Nitroaniline method: phenol reacts with diazotized 4-nitroaniline to form a red dye. The color can fluctuate between yellow, brown and red with other phenols. In addition to phenol most phenol derivatives are determined, too. For heavily polluted waters the phenols should first be separated by steam distillation.

NANOCOLOR® Phenolic index 5

REF 985 074

Type: tube test 0-74
Reaction basis: (a) DIN method
Measuring range: 0.2–5.0 mg/L phenolic index
Sufficient for: 20 test
Shelf life: at least 1.5 years
Sea water suitability: yes, after extraction with isobutyl methyl ketone



pH value



Reaction basis:

Photometric determination of the pH value in water with phenol red as indicator

NANOCOLOR® pH 6.5–8.2

REF 918 72

Type: tube test 0-72
Measuring range: pH 6.5–8.2
Sufficient for: 100 tests
Shelf life: at least 1.5 years
Sea water suitability: yes

Isobutyl methyl ketone

REF 918 929

for color extraction, for the tube test, for difficult sample matrices

Sufficient for: 12–24 tests

NANOCOLOR® Phenol

REF 918 75

Type: standard test 1-75
Reaction basis: (b) nitroaniline method
Measuring range: 0.01–7.0 mg/L phenol
Sufficient for: 440 tests
Shelf life: at least 3 years
Sea water suitability: yes, after dilution (1+9)

The system for photometric water analysis

Description of individual parameters and tests

Phosphate



Reaction bases:

(a) DIN method: ammonium molybdate reacts with orthophosphate ions to form phosphomolybdic acid. This is reduced to molybdenum blue. For the determination of total phosphate, an acidic oxidation at 100–120 °C must precede to detect poly- and organic phosphates (Reaction basis according to DIN EN ISO 6878-D11).

Occasional precipitations after the digestion can be filtered off with membrane filters. In case of a high content of organic matter and/or organically bound phosphorus, we recommend digestion with **NANOCOLOR® NanOx Metal** (REF 918 978).

(b) Vanadate method: ortho phosphate ions react with molybdate/vanadate to form a yellow phosphate-molybdate-vanadate complex.

For the determination of total phosphate, an acidic oxidation at 100–120 °C must precede to detect poly- and organic phosphates. Phosphorus compounds which are hard to oxidize can be digested with **NANOCOLOR® NanOx Metal** (REF 918 978).

Turbid solutions have to be filtered prior to the analysis of ortho phosphate. Strongly alkaline or strongly acidic sample solutions have to be adjusted to pH 3–10 for the test.



NANOCOLOR® ortho and total Phosphate 1

REF 985 076

Type: tube test 0-76
Reaction basis: (a) DIN method
Measuring range: 0.05–1.50 mg/L P ($\text{PO}_4\text{-P}$)
0.2–5.0 mg/L PO_4^{3-}
when using semi-micro cuvettes
50 mm (REF 919 50):
0.010–0.800 mg/L P ($\text{PO}_4\text{-P}$)
0.03–2.50 mg/L PO_4^{3-}
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes (ortho P)

NANOCOLOR® ortho and total Phosphate 5

REF 985 081

Type: tube test 0-81
Reaction basis: (a) DIN method
Measuring range: 0.20–5.00 mg/L P ($\text{PO}_4\text{-P}$)
0.5–15.0 mg/L PO_4^{3-}
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes (ortho P)

NANOCOLOR® ortho and total Phosphate 15

REF 985 080

Type: tube test 0-80
Reaction basis: (a) DIN method
Measuring range: 0.30–15.00 mg/L P ($\text{PO}_4\text{-P}$)
1.0–45.0 mg/L PO_4^{3-}
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes (ortho P)

NANOCOLOR® ortho and total Phosphate 45

REF 985 055

Type: tube test 0-55
Reaction basis: (a) DIN method
Measuring range: 5.0–50.0 mg/L P ($\text{PO}_4\text{-P}$)
15–150 mg/L PO_4^{3-}
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes (ortho P)

NANOCOLOR® ortho and total Phosphate 50

REF 985 079

Type: tube test 0-79
Reaction basis: (b) Vanadate method
Measuring range: 10.0–50.0 mg/L P ($\text{PO}_4\text{-P}$)
30–150 mg/L PO_4^{3-}
Sufficient for: 19 tests
Shelf life: at least 3 years
Sea water suitability: yes (ortho P)

NANOCOLOR® ortho Phosphate

REF 918 77

Type: standard test 1-77
Reaction basis: (a) DIN method
Measuring range: 0.04–6.5 mg/L $\text{PO}_4\text{-P}$
0.1–20.0 mg/L PO_4^{3-}
Sufficient for: 440 tests
Shelf life: at least 3 years
Sea water suitability: yes

NANOCOLOR® ortho Phosphate

REF 918 78

Type: standard test 1-78
Reaction basis: (b) Vanadate method
Measuring range: 0.2–17 mg/L $\text{PO}_4\text{-P}$
0.5–50 mg/L PO_4^{3-}
Sufficient for: 440 tests
Shelf life: at least 3 years
Sea water suitability: yes

Determination of total phosphorus with NANOCOLOR® NanOx Metal

For phosphorus compounds which are difficult to oxidize, we recommend digestion with **NANOCOLOR® NanOx Metal** (REF 918 978).

For details concerning the digestion with **NANOCOLOR® NanOx Metal** in a heating block please see page 122.

This digestion is also used, when total phosphorus is to be determined with standard tests 1-77 or 1-78.

The system for photometric water analysis

Description of individual parameters and tests

POC

POC

Polyoxycarboxylic acids (POC) are copolymers (e.g. from acrolein, acrylic acid, hydroxy- acrylic acid or maleic acid) with the general empirical formula $-\text{[CH}_2\text{-CO]}_n\text{-OR}$.

Polyacrylates are polymers based on the esters of acrylic acid with the general empirical formula $-\text{[CH}_2\text{-CH-COOR]}_n\text{-}$.

Polyoxycarboxylic acids and Polyacrylates are substances with outstanding dispersing properties. Therefore, they are used in boiler feed and cooling water as reagents for hardness stabilization, to prevent coating generated by calcium carbonate.

Reaction basis:

Photometric turbidity measurement with Hyamine® 1622

NANOCOLOR® POC 200

REF 985 070

Type: tube test 0-70
Measuring range: 20–200 mg/L POC AS 2020
20–200 mg/L POC HS 2020
20–200 mg/L Polystabil® DK
2–40 mg/L Polystabil® KWI

Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: yes, after dilution (1+3)

Potassium

K⁺

Reaction basis:

Potassium reacts with sodium tetraphenylborate to form an insoluble compound which can be measured as turbidity.

NANOCOLOR® Potassium 50

REF 985 045

Type: tube test 0-45
Measuring range: 2–50 mg/L K⁺
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+9)



Ammonium compensation reagent

REF 918 045

Supplementary reagent for the test NANOCOLOR® potassium 50 for removal of interfering ammonium (up to 5 mg/L NH₄-N)

Residual hardness

e

see total hardness, page 108

Sludge

TPF

see TTC, page 119

Silica/Silicon

SiO₂

Reaction basis:

DIN method: in acidic solution dissolved silica and silicates react with ammonium molybdate to form yellow silicomolybdic acid. This is reduced to a blue compound by addition of a reducing agent (Reaction basis according to DIN EN ISO 16264-H57).

It is important that the distilled water used for filling up or dilution is free of silica.

NANOCOLOR® Silica

REF 918 48

Type: standard test 1-48
Measuring range: 0.005–10.0 mg/L SiO₂
Sufficient for: 250 tests
Shelf life: at least 3 years
Sea water suitability: yes

Silica-free water

REF 918 912

for the analytical preparation, especially for minute concentrations of silicon, and for dilution of water samples
purity: < 0.005 mg/L SiO₂

Silver

Ag⁺

Reaction basis:

Silver ions react with an indicator to form a blue dye.

Insoluble silver compounds like silver bromide, silver chloride, silver iodide, silver cyanide or silverthiocyanate are not detected with this test.

These compounds can be determined after pretreatment with NANOCOLOR® NanOx Metal (REF 918 978).

NANOCOLOR® Silver 3

REF 985 049

Type: tube test 0-49
Measuring range: 0.20–3.00 mg/L Ag⁺
Sufficient for: 20 tests
Shelf life: at least 1.5 years
Sea water suitability: no

The system for photometric water analysis

Description of individual parameters and tests

Starch



Reaction basis:

Starch reacts with iodine in sulfuric acid solution to form a blue inclusion complex.

Oxidizing and reducing substances interfere.

NANOCOLOR® Starch 100

REF 985 085

Type: tube test 0-85
Measuring range: 5–100 mg/L starch
Sufficient for: 19 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+1)

Sulfate



Reaction basis:

turbidity measurement as barium sulfate (Reaction basis according to DIN 38405-D5-2).

Turbidities interfere and have to be filtered prior to the test. Good reproducibility is obtained for drinking, surface and ground water. Polluted waste waters cause low results.

NANOCOLOR® Sulfate 200

REF 985 086

Type: tube test 0-86
Measuring range: 10–200 mg/L SO_4^{2-}
Sufficient for: 20 tests
Shelf life: at least 3 years
Sea water suitability: no

NANOCOLOR® Sulfate 1000

REF 985 087

Type: tube test 0-87
Measuring range: 200–1000 mg/L SO_4^{2-}
Sufficient for: 20 tests
Shelf life: at least 3 years
Sea water suitability: no

Sulfide / Hydrogen sulfide



Reaction basis:

DIN method: *N,N*-Dimethyl-1,4-phenylene diamine reacts with hydrogen sulfide to form a compound which changes to leucomethylene blue. This compound is oxidized to methylene blue using iron(III) ions (Reaction basis according to DIN 38405-D26/27).

Sulfide is measured in an acidic medium; vigorous mixing can cause evaporation of gaseous hydrogen sulfide which escapes analysis.

NANOCOLOR® Sulfide 3

REF 985 073

Type: tube test 0-73
Measuring range: 0.05–3.00 mg/L S^{2-}
Sufficient for: 20 tests
Shelf life: at least 3 years
Sea water suitability: yes, after dilution (1+3)



NANOCOLOR® Sulfide

REF 918 88

Type: standard test 1-88
Measuring range: 0.01–3.0 mg/L S^{2-}
Sufficient for: 250 tests
Shelf life: at least 3 years
Sea water suitability: yes

The system for photometric water analysis

Description of individual parameters and tests

Sulfite



Reaction bases:

(a) Thiodibenzoic acid method: Sulfite reacts with a derivative of thiodibenzoic acid to form a yellow color complex, which is evaluated photometrically. Contrary to the reduction method (b), which also covers other reducing agents, this procedure is selective for sulfite.

(b) Reduction method: Sulfite ions bleach iodine solutions. The excess iodine is measured photometrically. Oxidizing and reducing substances interfere.

NANOCOLOR® Sulfite 10

REF 985 089

Type: standard test 0-89
Reaction basis: (a) Thiodibenzoic acid method
Measuring range: 0.2–10.0 mg/L SO_3^{2-}
when using semi-micro cuvettes
50 mm (REF 919 50):
0.05–2.40 mg/L SO_3^{2-}
Sufficient for: 20 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1:20)



NANOCOLOR® Sulfite 100

REF 985 090

Type: standard test 0-90
Reaction basis: (b) Reduction method
Measuring range: 5–100 mg/L SO_3^{2-}
Sufficient for: 19 tests
Shelf life: at least 1 year
Sea water suitability: yes

Surfactants (detergents)



Detergents are surface-active substances, which are classified into anionic, cationic and nonionic surfactants. They can be found in municipal and industrial waste waters.

Reaction bases:

(a) Methylene blue method: Under suitable conditions anionic detergents react with methylene blue to form a colored complex, which is extracted with an organic phase according to DIN 38 409-H23. Reference substance is methyl dodecylbenzene sulfonate (MBAS: 342 g/mol) (Reaction basis according to DIN 38409-H23-1).

(b) Bromophenol blue method: Cationic detergents react with bromophenol blue to form a colored complex, which is extracted with an organic phase. Reference substance is *N*-cetyl-*N,N,N*-trimethylammonium bromide (CTAB: 364.5 g/mol).

(c) Disulfine blue method: Cationic surfactants react with disulfine blue to form a colored complex, which is extracted with chloroform.

(d) TBPE method: Nonionic surfactants react with an indicator (TBPE = Tetrabromophenolphthaleinethylester) to form a complex, which is extracted with dichloromethane.

If a water contains cationic and anionic detergents, equivalent quantities are combined and escape analysis. Normally detergents are determined as a sum. For the analysis of specific detergents a correction factor has to be determined

NANOCOLOR® Anionic surfactants 4

REF 985 032

Type: tube test 0-32
Reaction basis: (a) methylene blue method
Measuring range: 0.20–4.00 mg/L MBAS
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+19)

NANOCOLOR® Detergents anionic

REF 918 32

Type: standard test 1-32
Reaction basis: (a) methylene blue method
Measuring range: 0.02–5.0 mg/L MBAS
Sufficient for: 40 tests
Shelf life: at least 3 years
Sea water suitability: no
The test kit contains chlorinated hydrocarbons; observe local regulations.

NANOCOLOR® Cationic surfactants 4

REF 985 034

Type: tube test 0-34
Reaction basis: (c) Disulfine blue method
Measuring range: 0.20–4.00 mg/L CTAB
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+19)

NANOCOLOR® Detergents cationic

REF 918 34

Type: standard test 1-34
Reaction basis: (b) bromophenol blue method
Measuring range: 0.05–5.0 mg/L CTAB
Sufficient for: 40 tests
Shelf life: at least 3 years
Sea water suitability: no
The test kit contains chlorinated hydrocarbons; observe local regulations.

NANOCOLOR® Nonionic surfactants 15

REF 985 047

Type: Tube test 0-47
Reaction basis: (d) TBPE method
Measuring range: 0.3–15.0 mg/L Triton® X-100
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: no

The system for photometric water analysis

Description of individual parameters and tests

Thiocyanate

SCN⁻

Reaction basis:

Thiocyanate reacts with iron(III) ions to form blood-red iron(III) thiocyanate.

The described method can also be used for detecting a thiocyanate interference during cyanide determination (test 1-30 and test 0-31).

NANOCOLOR® Thiocyanate 50

REF 985 091

Type: tube test 0-91
Measuring range: 0.5–50.0 mg/L SCN⁻
Sufficient for: 20 tests
Shelf life: at least 2 years
Sea water suitability: yes, after dilution (1+1)

Tin

Sn

Reaction basis:

Photometric determination of dissolved tin(II) and tin(IV) with 9-phenyl-3-fluorone.

NANOCOLOR® Tin 3

REF 985 097

Type: tube test 0-97
Measuring range: 0.10–3.00 mg/L Sn
Sufficient for: 18 tests
Shelf life: at least 1 year
Sea water suitability: yes, after dilution (1+9)



NANOCOLOR® TOC 60

REF 985 094

Type: tube test 0-94
Measuring range: 2–60 mg/L TOC
Sufficient for: 10 tests
Shelf life: at least 1 year
Sea water suitability: no



NANOCOLOR® TOC 600

REF 985 099

Type: tube test 0-99
Measuring range: 40–600 mg/L TOC
Sufficient for: 10 tests
Shelf life: at least 1 year
Sea water suitability: no

NANOCOLOR® Thermo caps

REF 916 116

for the determination of TOC
Content: 3 pcs

TTC/Sludge activity

TPF

Reaction basis:

Determination of the biochemical activity of sludge (activated sludge, digested sludge etc.) by means of the dehydrogenase activity using 2,3,5-triphenyltetrazoliumchloride (TTC). Colorless TTC is converted into red triphenylformazane (TPF) by dehydrogenases. The formed, water-insoluble TPF is dissolved in ethanol and is determined photometrically.

This method allows the determination of the biochemical activity of sludge samples, the characterization of the action of waste waters and waste water constituents towards sludge and a rapid visual evaluation of the degree of stabilization of a sludge.

NANOCOLOR® TTC/Sludge activity 150

REF 985 890

Type: tube test 8-90
Measuring range: 5–150 µg TPF
Sufficient for: 20 tests
Shelf life: at least 2 years at 2–8 °C
Sea water suitability: no

TOC

TOC

Total organic carbon

Reaction basis:

clear and simple two-step procedure:

1. Removal of inorganic carbon (TIC)
2. Digestion of organic carbon (TOC) and determination of the CO₂ formed as color decrease of an indicator (Reaction basis according to DIN EN 1484)

NANOCOLOR® TOC 25

REF 985 093

Type: tube test 0-93
Measuring range: 2.0–25.0 mg/L TOC
Sufficient for: 10 tests
Shelf life: at least 1 year
Sea water suitability: no

The system for photometric water analysis

Description of individual parameters and tests

Turbidity

FAU/NTU

Reaction bases:

The turbidity is measured by comparison with formazine-standard suspensions. The result can be given as spectral attenuation coefficient in 1/m according to German and international standard methods (Reaction basis according to DIN EN ISO 7027-C2)

- (a) Turbidity measurement with 180° transmitted light
- (b) Turbidity measurement with 90° scattered light

NANOCOLOR® Turbidity

Test 1-92

Type: no reagents required
test 1-92

Reaction basis: (a) turbidity measurement with 180°
transmitted light

Measuring range: 1–100 FAU
0.2–40.0 1/m

Sea water suitability: yes

NANOCOLOR® Turbidity

Test 9-06

Type: no reagents required
test 9-06

Reaction basis: (b) turbidity measurement with 90°
scattered light

Measuring range: 1–1000 NTU

Sea water suitability: yes

The nephelometric turbidity measurement is only possible with the spectrophotometers *NANOCOLOR®* ^{UV/VIS} and *NANOCOLOR®* VIS.

Zinc

Zn

Reaction basis:

At pH 8.5–9.5 zinc ions react with zincon to form a blue color complex.

NANOCOLOR® Zinc 4

REF 985 096

Type: Tube test 0-96

Measuring range: 0.10–4.00 mg/L Zn²⁺

Sufficient for: 20 tests

Shelf life: at least 1 year

Sea water suitability: yes, after dilution (1+1)

NANOCOLOR® Zinc

REF 918 95

Type: Standard test 1-95

Measuring range: 0.02–3.0 mg/L Zn²⁺

Sufficient for: 250 tests

Shelf life: 3 years

Sea water suitability: yes, after dilution (1+9)

Reagents for lime precipitation

REF 918 939

Reagents for elimination of interfering calcium (up to 20 g/L Ca²⁺) for copper, nickel and zinc determinations.

Sufficient for: 20 tests

Shelf life: at least 2 years



Chemicals for special NANOCOLOR® procedures

Ordering information

Description	Pack of	REF
Distilled water for dilutions	1 L	918 932
Silica-free water for the preparation of a blank value for the determination of silica	1 L	918 912
COD-free water for dilutions of samples prior to COD analysis	50 mL	918 993
Isobutyl methyl ketone* (MIBK) for tube test phenolic index 5 (method 1-742)	100 mL	918 929
Chloride complexing agent for COD analysis	100 mL	918 911
Amidosulfuric acid* for elimination of nitrite interferences	25 g	918 973
Reagents for sample preparation by clarification precipitation, for the determination of nitrite in cooling lubricants etc.	2 x 30 mL	918 937
Reagents for lime precipitation, for removal of interfering calcium for determinations of copper, nickel and zinc	100 g	918 939
Ammonium compensation reagent*	30 mL	918 045

The system for photometric water analysis

Special **NANOCOLOR**[®] procedures

Determination of total nitrogen

In some countries government regulations require a complete nitrogen balance for effluents. Besides ammonium, nitrite and nitrate, organic nitrogen compounds have to be determined – the sum of all these nitrogen compounds is called total nitrogen.

The Standard Method DIN EN ISO 11 905-1 describes the procedure for the determination of total N. After formation of nitrate by oxidative digestion of all inorganic and organic

nitrogen-containing substances, a subsequent nitrate determination gives the total nitrogen content in mg N per liter. In samples with low nitrate and nitrite concentrations this method directly gives similar results to the determination of Total Kjeldahl Nitrogen TKN (including only ammonium and organic nitrogen compounds). In the presence of detectable amounts of nitrate/nitrite, the TKN can be determined by subtracting nitrate/nitrite nitrogen from total nitrogen.

NANOCOLOR[®] *NanOx N* – Oxidative digestion of samples containing nitrogen compounds

NanOx N consists of convenient solid oxidative digestion reagents (potassium peroxodisulfate) and solid compensation reagents for elimination of interfering substances. After digestion with *NanOx N*, the samples can be analyzed with **NANOCOLOR**[®] Nitrate tube or standard tests.

or

NANOCOLOR[®] total Nitrogen **TN_b 220** REF 985 088

Type: tube test 0-88
Measuring range: 5–220 mg/L N
Shelf life: at least 1 year

The above mentioned tests are convenient combinations of **NANOCOLOR**[®] *NanOx N* reagents, predosed tube tests for determination of total N and digestion tubes.

or

NANOCOLOR[®] *NanOx N* REF 918 979

empty reaction tubes 16 mm OD REF 916 80

NANOCOLOR[®] Nitrate 50 REF 985 064

Type: tube test 0-64
Measuring range: 0.3–22.0 mg/L N
Shelf life: at least 2 years

or

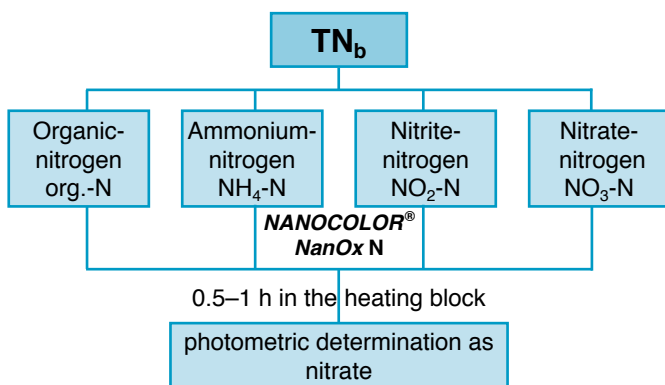
NANOCOLOR[®] *NanOx N* REF 918 979

empty reaction tubes 16 mm OD REF 916 80

NANOCOLOR[®] Nitrate REF 918 65

Type: tube test 1-65
Measuring range: 0.9–30.0 mg/L N
Shelf life: at least 2 years

Dilution of the sample can considerably increase the measuring ranges.



For this digestion the following reagents and accessories are required:

NANOCOLOR[®] total Nitrogen **TN_b 22** REF 985 083

Type: tube test 0-83
Measuring range: 0.5–22.0 mg/L N
Shelf life: at least 1 year

or

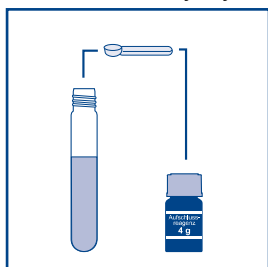
NANOCOLOR[®] total Nitrogen **TN_b 60** REF 985 092

Type: tube test 0-92
Measuring range: 3–60 mg/L N
Shelf life: at least 1 year

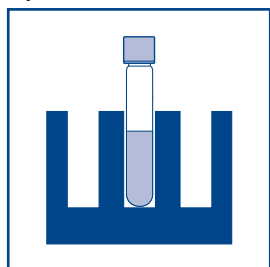
NEW!

Digestion in a heating block

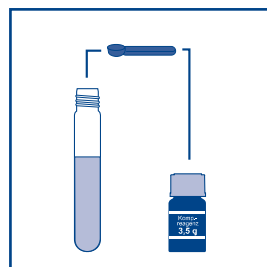
- Easy handling
- Choice for everyday routine analyses



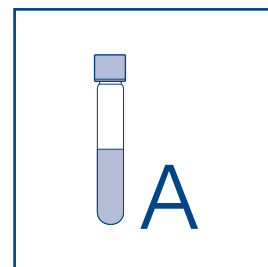
Mix sample with **NANOCOLOR**[®] *NanOx N* digestion reagent



Boil: 30 min at 120 °C or
1 h at 100 °C



Add compensation reagent



Decomposed sample for the test procedure

The system for photometric water analysis

Special **NANOCOLOR**[®] procedures

Determination of total phosphorus

The element phosphorus occurs in many different circulations on earth. In waters, phosphorus containing substances are unwanted, whereas in soil phosphorus is an important fertilizer for the growth of plants. Phosphates occur in many different waters, mainly as ortho- and polyphosphates. Most phosphates reach the waters via the municipal and industrial waste water. They derive from detergents, residues of human and animal excrements and from soluble contents of fertilizers. The discharge of phosphates to rivers and lakes leads to eutrophication, an increased growth of algae and water plants.

In many countries governmental regulations require a complete phosphorus balance for effluents. Besides ortho-phosphates, also phosphonates and organic phosphorus compounds have to be determined – the sum of all these compounds is called total phosphorus. After formation of phosphate by oxidative digestion of all inorganic and organic phosphorus-containing substances, a subsequent determina-



tion of phosphate gives the total phosphorus content in mg P per liter.

The **NANOCOLOR**[®] system offers several rapid and convenient methods for sample preparation and determination of total phosphorus.

a) **NANOCOLOR**[®] tube tests for digestion in a heating block

- Solid reagent capsules for digestion
- Pre-dosed tube tests for determination of total P
- Digestion and photometric evaluation in one and the same test tube
- The choice for everyday routine analyses

For a correct determination of total P with **NANOCOLOR**[®] tube tests, the following reagents are available:

NANOCOLOR[®] ortho and total Phosphate 1

REF 985 076

Type: tube test 0-76
Measuring range: 0.05–1.50 mg/L P (PO₄-P)
Shelf life: at least 1 year

NANOCOLOR[®] ortho and total Phosphate 5

REF 985 081

Type: tube test 0-81
Measuring range: 0.20–5.00 mg/L P (PO₄-P)
Shelf life: at least 1 year

NANOCOLOR[®] ortho and total Phosphate 15

REF 985 080

Type: tube test 0-80
Measuring range: 0.30–15.00 mg/L P (PO₄-P)
Shelf life: at least 1 year

NANOCOLOR[®] ortho and total Phosphate 45

REF 985 055

Type: tube test 0-55
Measuring range: 5.0–50.0 mg/L P (PO₄-P)
Shelf life: at least 1 year

NANOCOLOR[®] ortho and total Phosphate 50

REF 985 079

Type: tube test 0-79
Measuring range: 10.0–50.0 mg/L P (PO₄-P)
Shelf life: at least 3 years

b) **NANOCOLOR**[®] standard tests and **NanOx Metal** for digestion in a heating block

For frequent analyses of large numbers of samples, **NANOCOLOR**[®] standard tests are the choice for determination of total P. For a correct determination of total P the following reagents and accessories are required:

NANOCOLOR[®] **NanOx Metal**

REF 918 978

empty reaction tubes 16 mm OD

REF 916 80

NANOCOLOR[®] ortho Phosphate

REF 918 77

Type: standard test 1-77
Measuring range: 0.04–6.5 mg/L P (PO₄-P)
Shelf life: at least 3 years

or

NANOCOLOR[®] **NanOx Metal**

REF 918 978

empty reaction tubes 16 mm OD

REF 916 80

NANOCOLOR[®] ortho Phosphate

REF 918 78

Type: standard test 1-78
Measuring range: 0.2–17 mg/L P (PO₄-P)
Shelf life: at least 3 years

The system for photometric water analysis

Special NANOCOLOR® procedures

Oxidation of samples containing heavy metals

In practice an analysis often recovers only the quantity of metals which is present in the sample as dissolved ions. If the total content of a metal has to be determined (particularly samples of highly contaminated water or industrial waste water), it must be digested to avoid falsely negative or falsely low results. Usually, by applying acid and heat, undissolved metal oxides are dissolved, metal ions are released from complexes and adsorptive compounds or interfering organic substances are eliminated. Thus, maximum recovery rates can be achieved for the analysis of heavy metals.

The NANOCOLOR® system offers various rapid and convenient methods for sample preparation with solid reagents for regular digestion and liquid reagents for vigorous digestion.



NANOCOLOR® NanOx Metal – Oxidative digestion of samples containing heavy metals

NANOCOLOR® NanOx Metal consists of convenient solid oxidative digestion reagents (potassium peroxodisulfate) and solid neutralization reagents for pH adjustment prior to the subsequent determination of metals.

NANOCOLOR® NanOx Metal
empty reaction tubes 16 mm OD

REF 918 978
REF 916 80

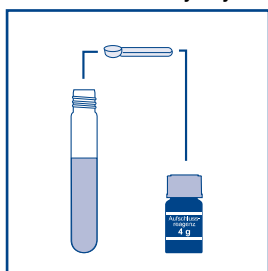
After digestion with *NanOx Metal*, the samples can be analyzed with the following NANOCOLOR® tests:

Test 0-98 Aluminum 07 *	Test 0-54 Copper 7
Test 1-02 Aluminum *	Test 0-37 Iron
Test 1-13 Cadmium	Test 1-36 Iron
Test 0-14 Cadmium 2	Test 0-61 Nickel 7
Test 0-24 Chromate 5 (Chromium)	Test 1-62 Nickel
Test 1-25 Chromate (Chromium)	Test 0-49 Silver
Test 1-51 Cobalt	Test 1-95 Zinc
Test 1-53 Copper	Test 0-96 Zinc 4

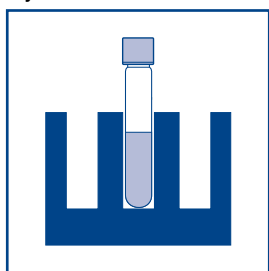
*only with microwave digestion

Digestion in a heating block

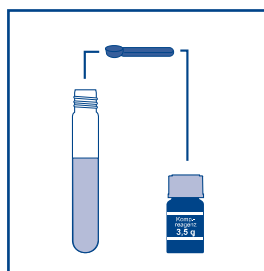
- Easy handling
- Choice for everyday routine analyses



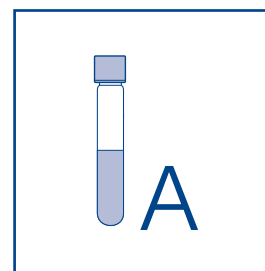
Mix sample with
NANOCOLOR® NanOx
Metal digestion reagent



Boil: 30 min at 120 °C or
1 h at 100 °C



Add compensation reagent



Decomposed sample for the
test procedure

The system for photometric water analysis

Special NANOCOLOR® procedures

NANOCOLOR® Crack set

Liquid reagents for oxidative digestion of samples containing heavy metals

The crack set is used for oxidative sample preparation in acidic medium (sulfuric acid/potassium peroxodisulfate) under normal pressure at 100 °C in a heating block. The crack set is recommended for the complete and vigorous digestion of very resistant samples.

After digestion, the samples can be analyzed in accordance with the instructions for the respective NANOCOLOR® tests. For this digestion the following reagents and accessories are required:

NANOCOLOR® Crack set REF 918 08

Type: Reagent set for sample preparation
Shelf life: at least 3 years

Reaction basis:

Digestion with sulfuric acid/potassium peroxodisulfate at 100–120 °C. Some stable heavy metal cyanide complexes are not completely destructible.

The reagent set NANOCOLOR® Crack set contains all reagents required for the oxidative digestion and subsequent neutralization. Additionally, a heating block with 22 mm bores and reagent sets for determination of the individual metals are required



Accessories for crack set · Ordering information

Description	Pack of	REF
Tube for sample digestion 22 mm diameter, NS 19/26, with glass stopper	2	916 66
Condenser 200 mm, type KS, NS 19/26 bottom and NS 29/32 top, with 3 m polyethylene tubing	1	916 67
Absorption attachment for condenser, NS 29/32	1	916 68

After digestion the sample can be analyzed with the following NANOCOLOR® tests:

Test 0-09 Lead	Test 1-36 Iron
Test 0-14 Cadmium 2	Test 1-51 Cobalt
Test 0-37 Iron 3	Test 1-53 Copper
Test 0-54 Copper 7	Test 1-62 Nickel
Test 0-61 Nickel 7	Test 1-95 Zinc
Test 0-96 Zinc 4	

NANOCOLOR® Sludge

Liquid reagents for oxidative digestion of sludge containing heavy metals

In Germany, the use of sludge for soil improvement in farming and forestry and in gardening is regulated by government regulations which define the maximum contents of 7 heavy metals (Cd, Cr, Cu, Hg, Ni, Pb, Zn) allowable in sludge for the above applications. The NANOCOLOR® reagent set sludge 50 allows even non-chemists to determine these contents with high accuracy. It is, however, recommended that you arrange for the supplier of the kit to provide instructions to those members of your team likely to be involved in its use.

With the exception of mercury and lead all of the above metals can be determined with the NANOCOLOR® analytical system. The photometers NANOCOLOR® 250 D and 350 D cannot be used for this sludge analysis. When using the photometers NANOCOLOR® UV/VIS, VIS, 500 D, 400 D or 300 D, you can directly read results as mg/kg dried residue of sludge (S). For a digestion of sludge we recommend the following reagents and accessories:

NANOCOLOR® Sludge REF 918 50 NANOCOLOR® Sludge REF 918 501

Type: Reagent sets for digestion with aqua regia
Shelf life: at least 3 years

Reagent set 918 501 does not contain the nitric acid 65 % and hydrochloric acid 3 % required for the digestion and is thus suited for airfreight. The acids have to be purchased separately from a local laboratory supply store.

Reaction basis:

Mineralisation of sludge and soil samples with aqua regia at 100 °C and preparation of a solution for metal analysis according to DIN 38-414-S7. Additionally, reagent sets for determination of the individual metals are required.

Accessories for sludge analysis · Ordering information

Description	REF
Combination of all equipment required for sludge analysis (without reagents, photometer and heating block): 1 mortar with pestle, 2 tubes for sample digestion with stoppers, 1 condenser with connecting tubing, 1 absorption attachment, 100 filter circles MN 1670, 11 cm diameter, 100 filter circles MN 640 d, 15 cm diameter, 1 plastic wash bottle 500 mL, 1 holder for round glass tubes and tubes for sample digestion, 2 volumetric flasks 100 mL, 1 Erlenmeyer flask 200 mL, 1 measuring cylinder 50 mL, 1 pipette 50 mL, 1 glass funnel each with 60 mm and 80 mm diameter, 100 test strips pH-Fix 0–14, 1 double spatula 180 mm, safety glasses, bulb for filling 20 mL pipettes, instructions for use	916 10

After digestion the sample can be analyzed with the following NANOCOLOR® tests:

Test 1-13 ₂ Cadmium	1–100 *
Test 1-25 ₃ + 1-25 Chromium	20–1800 *
Test 1-53 Copper	20–4000 *
Test 1-62 Nickel	2–400 *
Test 1-95 Zinc	80–6000 *

* ranges in mg/kg for NANOCOLOR® UV/VIS, VIS, 500 D, 400 D, Linus and 300 D

The system for photometric water analysis

Special **NANOCOLOR**[®] procedures

AOX analysis has never been so easy and reliable before!

The AOX content represents the sum of organically bound halogens (chlorine, bromine, iodine) which are adsorbable to a suitable adsorbent; their concentration is expressed as chloride.

The rapid test **NANOCOLOR**[®] AOX 3 allows the determination of AOX in natural waters, industrial or municipal waste waters and sea water. The test is based on an easy three-step procedure:

1. Solid phase extraction with the **NANOSORB** adsorbent for AOX according to DIN 38 409-22
2. Oxidative digestion of the enriched adsorbent in a heating block at 120 °C or in a microwave oven
3. Photometric determination of AOX as chloride

Advantages of **NANOCOLOR**[®] AOX 3

- The complete test procedure takes less than 60 minutes.
- No expensive instrumentation is required; the test can be performed and evaluated with the usual equipment for photometric water analysis.
- In contrast to carbon-based adsorbents, the use of **NANOSORB** for AOX, a polymeric adsorbent pad, avoids interferences by inorganic halides, which can be removed entirely from the adsorbent. Even in sea water, with chloride contents of up to 20 g/L (!), reproducible results are obtained.
- For convenient handling, **NANOSORB** for AOX pads come individually prepackaged in plastic cartridges, protecting the adsorbent during adsorption.
- The use of pre-dosed reagents shortens the procedure and reduces the analyst's exposure to chemicals to a minimum.
- Outstanding recovery rates can be achieved, even in undiluted samples with high COD contents.
- Application of the automatic pump set increases the sensitivity of the test kit and facilitates the use of **NANOSORB** for AOX.

For a correct determination of AOX you need the following reagents and accessories:

NANOCOLOR[®] AOX 3

REF 985 007

Type: tube test 0-07
Measuring range: 0.1–3.0 mg/L AOX
0.01–0.3 mg/L AOX
Shelf life: at least 1 year

NANOCOLOR[®] starter set for AOX 3

REF 916 111

Includes useful accessories for the determination of AOX with reagent set AOX 3; recommended to be ordered with the first order of reagent set AOX 3



Supplement kit for AOX 3

REF 918 072

Contains additional oxidizing reagents for the sensitive AOX range (0.01–0.3 mg/L AOX) as well as for COD-contaminated samples between 50 and 1000 mg/L COD

Shelf life: at least 1 year

Pump set for AOX 3

REF 916 115

Required to increase the sensitivity of reagent set AOX 3 or simply a useful auxiliary for convenient solid phase extraction with **NANOSORB** for AOX



NANOCOLOR[®]

The system for photometric water analysis

Special NANOCOLOR® procedures

BOD₅ – Biochemical oxygen demand

Together with the chemical oxygen demand (COD) the biochemical oxygen demand (BOD) is the most important sum parameter for an estimation of the pollution of waste water.

The BOD is defined as the amount of oxygen per volume, which is used by the microorganisms at 20 °C for oxidative degradation of the organic substances present in the water.

Normally, the BOD is determined over a period of 5 days, and is then called BOD₅. MACHEREY-NAGEL offers two tests for the determination of the BOD₅: a method with sample incubation in Winkler bottles, in accordance with DIN EN 1899-1-H51, and a quick, simplified tube test.

Benefits of NANOCOLOR® BOD₅

- Recovery rates within the tolerances stated in DIN EN 1899-1-H51
- Oxygen measurement similar to DIN EN 25813-621, no manometers required

- Use of a nitrification inhibitor avoids oxygen consumption caused by oxidation of ammonium and nitrite (nitrification)
- Sample incubation in Winkler flasks in accordance with DIN EN 1899-1-H51 or
- Simplified incubation and oxygen measurement in one and the same test tube
- Photometric evaluation with all types of NANOCOLOR® photometers – no additional instrumentation necessary
- Clear evaluation form for hand-written step-by-step calculation of the BOD₅

For a correct determination of the BOD₅ you need the following reagents and accessories:

a) BOD₅ determination in Winkler bottles according to DIN EN 1899-1-H51

NANOCOLOR® BOD₅

REF 985 822

Type: in Winkler bottles, according to DIN EN 1899-1-H51, test 8-22
Measuring range: 0.5–3000 mg/L O₂
Shelf life: at least 2 years



BOD₅-accessories set

REF 916 918

Includes useful accessories for sample preparation prior to the determination of BOD₅, recommended to be ordered with the first order of the tube test BOD₅.

The accessories set consists of an electric air pump, 2 aerating bricks, tubing, a 10 L PE container, a 1 L laboratory bottle and 4 Winkler bottles.

BOD₅ nutrient mixture

REF 918 994

Without nitrification inhibitor *N*-allylthiourea (ATU).

Ready-to-use supplementary reagents for preparation of the inoculating water for BOD₅ test 8-22.

BOD₅ nutrient mixture Plus

REF 918 995

With nitrification inhibitor *N*-allylthiourea (ATU).

Ready-to-use supplementary reagents for preparation of the inoculating water for BOD₅ test 8-22.

b) BOD₅ determination as simplified tube test

Simple determination of the biochemical oxygen demand after 5 days (BOD₅) of undiluted samples without using a control in accordance with DIN EN 1899-2-H52! The oxygen enriched, undiluted sample is incubated in test tubes for 5 days at 20 ± 1°C in the dark. Determination of the dissolved oxygen after 5 days is based on the Winkler procedure, DIN EN 25813-G21.

NANOCOLOR® BOD₅-TT

REF 985 825

Type: tube test 8-25
Measuring range: 0.5–3000 mg/L O₂
Shelf life: at least 2 years

Includes nitrification inhibitor *N*-allylthiourea (ATU) to prevent falsely high BOD₅ results due to high ammonium concentrations.

BOD₅ accessories set

REF 916 925

Includes useful accessories for sample preparation prior to the determination of BOD₅-TT, recommended to be ordered with the first order of the tube test BOD₅-TT.

The accessories set consists of 1 electric air pump, 2 aerating bricks, tubing, 1 1000 mL PE container and 2 40 mL reaction vessels.

Spare parts · Ordering information

Description	Pack of	REF
Oxygen bottles according to Winkler	4	916 919
4 aerating bricks	4	916 920
10 reaction vessels for BOD ₅ -TT	10	916 926

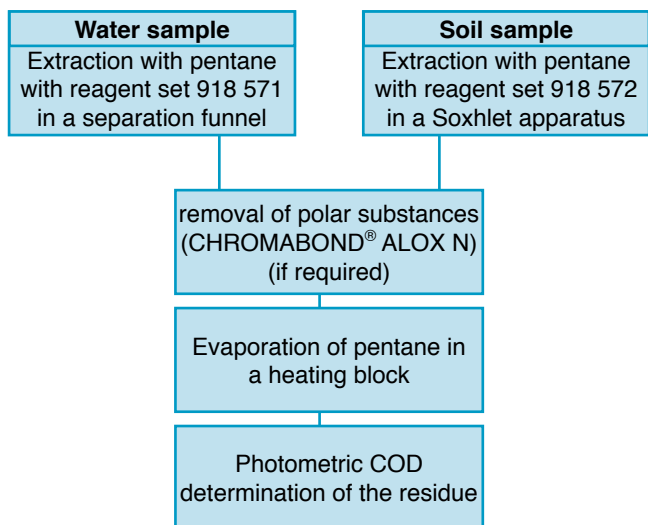
The system for photometric water analysis

Special **NANOCOLOR**[®] procedures

Hydrocarbons/lipophilic substances

The rapid test **NANOCOLOR**[®] HC 300 (Hydrocarbons) is based on a MN-patented method. Hydrocarbons with a boiling temperature above 120 °C can be detected in a clear fivestep procedure:

1. Extraction of hydrocarbons from the sample
2. Removal of polar substances
3. Evaporation of the extraction solvent
4. Oxidative digestion in a heating block
5. Photometric determination of hydrocarbons



Benefits of **NANOCOLOR**[®] HC 300

- Applicable for water and soil
- Extraction without halogenated solvents
- Mercury-free reagents
- Outstanding selectivity
- Complete removal of polar substances by solid phase extraction with CHROMABOND[®] ALOX N columns
- Can be adapted to the determination of lipophilic substances
- Evaluation with all types of **NANOCOLOR**[®] photometers – no expensive analytical instrumentation required

For a correct determination of hydrocarbons you need the following reagents and accessories:

NANOCOLOR[®] HC 300 REF 985 057 after extraction from water or soil samples

Type:	tube test 0-57	
Measuring range:	0.5–5.6 mg/L HC	
	30–300 mg/kg HC	
Shelf life:	at least 1 year at 15–25 °C	
Reaction tubes (empty, pack of 20)		REF 916 80
Threaded couplings (pack of 2)		REF 916 04
Stop valves for piston pipettes (pack of 100)		REF 916 21

For determination of hydrocarbons in water

Extraction kit HC from water REF 918 571

Shelf life:	1.5 years	
Separation funnel 500 mL (pack of 2)		REF 916 08
Volumetric flask 25 mL (pack of 2)		REF 916 61

For determination of hydrocarbons in soil

Extraction kit HC from soil REF 918 572

Shelf life:	1.5 years	
Soxhlet apparatus 30 mL (additionally a heater is required)		REF 916 05
Extraction thimbles (pack of 25)		REF 645 008
Volumetric flask 50 mL (pack of 2)		REF 916 06

For removal of fatty acids, fat or other polar compounds

CHROMABOND [®] SPE columns ALOX N (pack of 20)		REF 730 250
Plastic syringes 50 mL (pack of 10)		REF 916 09
Syringe adapters (pack of 2)		REF 916 03



The system for photometric water analysis

NANOCOLOR® accessories

A comprehensive analytical system should include all accessories required for the analytical procedure, such as equipment for sampling, sample preparation and conservation, for digestion reactions, extraction and filtration – from analytical preparations to protective accessories for safe operation. All these components improve analytical procedures and thus help to obtain optimum results.

NANOCOLOR® membrane filters

Removal of turbidities (fine filtration) is recommended for two reasons:

- Turbidities interfere with photometric determinations, intense turbidities must be removed prior to the analysis.
- When both soluble and total amounts of a substance (e.g. iron, manganese, COD etc.) have to be determined, part of the sample has to be filtered to remove undissolved particles. The German Standard Methods use a pore size of 0.45 µm as standard for differentiation between dissolved and undissolved particles.

Additionally we offer a pore size of 1.2 µm.



Ordering information

Description	Pack of	REF
Membrane filtration kit 0.45 µm: 2 syringes 20 mL and 25 CHROMAFIL® membrane filters 0.45 µm	1 kit	916 50
CHROMAFIL® membrane filters 0.45 µm	50	916 52
Membrane filtration kit 1.2 µm: 2 syringes 20 mL and 25 CHROMAFIL® membrane filters 1.2 µm	1 kit	916 511
CHROMAFIL® membrane filters 1.2 µm	50	916 513
Membrane filtration kit: 2 syringes 20 mL and 25 CHROMAFIL® membrane filters GF/PET	1 kit	916 01
CHROMAFIL® membrane filters GF/PET	50	916 02

Piston pipettes and pipette stand

Exact dosage of water sample and reagents is prerequisite for analytical accuracy. We offer a complete line of piston pipettes – with fixed or adjustable volume.

- Convenient operation – exact dosage
- Guarantees clean analytical work through use of disposable tips
- High security when working with toxic or corrosive substances, because direct contact is avoided
- Clean and safe storage of the valuable pipettes in a pipette stand
- All pipettes are supplied with tip ejector



Ordering information

Description	Pack of	REF
200 µL piston pipette (without tips)	1	916 72
Plastic tips for 50–200 µL piston pipettes	100	916 915
500 µL piston pipette (without tips)	1	916 53
Plastic tips for 200–1000 µL piston pipettes	100	916 76
1.0 mL piston pipette (without tips)	1	916 71
Plastic tips for 200–1000 µL piston pipettes	100	916 76
2.0 mL piston pipette (without tips)	1	916 917
Plastic tips for 1.0–5.0 mL piston pipettes	100	916 916
5–50 µL digital piston pipette, adjustable	1	916 58
50–200 µL digital piston pipette, adjustable	1	916 914
Plastic tips for 5–50 and 50–200 µL piston pipettes	100	916 915
200–1000 µL digital piston pipette, adjustable	1	916 77
Plastic tips for 200–1000 µL piston pipettes	100	916 76
1.0–5.0 mL digital piston pipette, adjustable	1	916 909
Plastic tips for 1.0–5.0 mL piston pipettes	100	916 916
Pipette stand for 6 piston pipettes	1	916 79

The system for photometric water analysis

NANOCOLOR® accessories

General analytical accessories

Ordering information

Description	Pack of	REF
Volumetric flask 10 mL for reduced analytical preparations	2	916 42
Volumetric flask 25 mL with NS 10/19 and polyethylene stopper for analytical preparations	2	916 61
Volumetric flask 100 mL with NS 12/21 and polyethylene stopper	2	916 83
Erlenmeyer flask 50 mL	1	916 212
Erlenmeyer flask 100 mL	1	916 38
Measuring cylinder 50 mL	1	916 84
Pipette 20 mL, short version	1	916 62
Bulb for filling pipettes	1	916 65
Glass funnel 60 mm diameter	1	916 81
Glass funnel 80 mm diameter	1	916 82
Filter circles MN 1670, 11 cm diameter	100	470 011
Filter circles MN 640 d, 15 cm diameter	100	205 015
Plastic wash bottle 500 ml	1	916 89
Magnetic stirring unit without heater	1	970 115
Mini-magnets for stirring (30 x 6 mm)	1	916 211
Timer with digital display and acoustic signal (up to 99:59 min)	1	916 96
Electric air pump with delivery tube	1	916 55
Double spatula, 18/8 steel, 180 mm long	1	916 94
Porcelain mortar 90 mm diameter with pestle	1	916 88
Holder for 15 round glass tubes and 2 tubes for sample digestion	1	916 36
Safety bottle for shaking COD test tubes	1	916 37
Safety kit, consist of safety glasses, gloves and rubber apron	1 kit	916 90
Accessory set for TOC (small) for single measurement and small sample throughput	1 kit	916 990
Accessory set for TOC (big) for multi measurements and big sample throughput	1 kit	916 991
Beaker 100 mL, incl. magnetic stir bar 35 mm	2 kits	916 992



NANOCOLOR®

Quality control for photometric water analysis

NANOCOLOR

The NANOCOLOR system for analytical quality control

Quality control is an essential aspect in any lab and its importance is growing constantly. All components of a measuring system, such as reagents and test kits, the actual measuring equipment and personal handling need to be monitored and checked on a regular basis in most labs. This is important to ensure accurate results and to fulfill validation and auditing requirements

The NANOCOLOR system offers a complete range of products for analytical quality control of analyses carried out with the NANOCOLOR® system.

- NANOCOLOR standards
- NANOCOLOR 100+ addition solution
- NANOCOLOR NANO CHECK
- NANOCOLOR NANOTURB

In line with the overall NANOCOLOR® system, no additional equipment or special training is needed to use NANOCOLOR. The NANOCOLOR system provides users with all necessary components to check the entire NANOCOLOR® analysis range:

- NANOCOLOR® reagents and test kits
- NANOCOLOR® photometers and heating blocks
- Personal handling and work flow

Using NANOCOLOR requires just slightly more effort, but gives you all the safety and assurance you need to backup and confirm your results and the work of your lab.

NANOCOLOR NANO CHECK

Test solutions for the determination of photometric accuracy

NANOCOLOR NANO CHECK is a secondary standard to control inspection, measuring and test equipment in accordance to ISO 9001 and ISO 14001. The test solutions have been checked in a reference photometer monitored with primary standards (NIST-Standards) with all results being documented. With just 2 stable color solutions the wavelength accuracy and the linearity of absorbance measurements can be checked. NANOCOLOR NANO CHECK fulfills the requirements of analytical quality control according to DWA-advisory leaflet A 704 (Operational Methods for the Self-Monitoring of Wastewater Systems).

NANOCOLOR NANO CHECK

REF 925 701

Shelf life: at least 1 year



NANOCOLOR NANOTURB

Turbidity standard for nephelometric turbidity measurements

NANOCOLOR NANOTURB is a turbidity standard for nephelometric turbidity measurements for our spectrophotometers NANOCOLOR® UV/VIS and NANOCOLOR® VIS.

The solutions are suitable as a primary standard for calibration and testing of the nephelometric turbidity unit according to ISO 7027. The NANOCOLOR NANOTURB solutions are free of hazardous or carcinogenic substances and don't have to be labeled as hazardous goods. The test solutions come ready to use and just have to be inserted into the photometer. Dilution steps or contact with chemicals is thus effectively avoided.

NANOCOLOR NANOTURB

REF 925 702

Shelf life: 8 months
Content: 1 tube with test solution 1 NTU
1 tube with test solution 4 NTU
1 tube with test solution 100 NTU
1 tube with test solution 400 NTU



NEW!

NANOCONTROL analysis standards

NANOCONTROL Standards

NANOCONTROL Standard solutions contain a defined concentration of a particular substance. The standard concentration lies roughly within the middle of the respective test's measuring range. The standard has a narrow confidence interval, which is given with each standard solution. Using the standard is very simple. Instead of an actual water sample, you

use the NANOCONTROL Standard solution and run the test as usual. If the result lies within the confidence interval, you can be sure all individual components of your measurement system are working well and there are no handling errors. If you find deviations, equipment and tests should be checked and monitored again.



NANOCONTROL Multistandards

In addition to single standards, MACHEREY-NAGEL offers standard solution mixtures that are created for specific application areas, such as waste water treatment plants or water

works. NANOCONTROL Multistandards allow you to check and document multiple significant parameters in one single step.

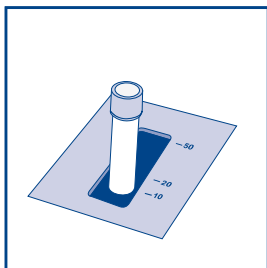
NANOCONTROL 100+ addition solutions

Monitoring interferences due to the sample matrices, which means checking whether additional substances within the sample may interfere with the determination of a specific parameter is especially important if:

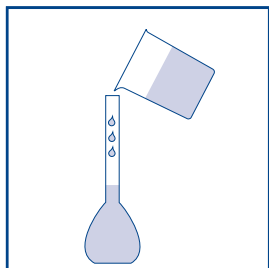
- You start a new analytical series with an unknown sample matrix
- You know that your sample contains interfering substances, e. g. proteins, larger amounts of salts etc.
- You find continuous major deviations from other analytical procedures
- You question the accuracy of your own analytical results

The principle of standard additions is to increase the concentration of a sample in defined steps. The recovery rate is then an indication of possible interferences. A constant and proportional deviation allows you to correct and adapt the result. For the multistandard solution, NANOCONTROL 100+ addition solution is also available. Due to the complex sample composition, we recommend a simplified procedure with one single addition of 1.0 mL NANOCONTROL 100+ addition solution.

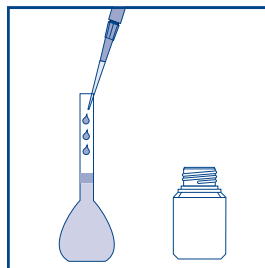
Using NANOCONTROL 100+ addition solution



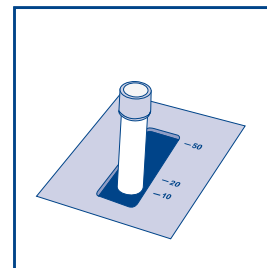
Measure the concentration before adding 100+ solution.



Fill a 100 mL volumic flask with the sample.



Add 1.0 mL 100+ solution and mix.






Measure the concentration again.

The difference between the measurements should agree with the theoretical value of the 100+ solution.

Quality control for photometric water analysis

NANOCOLOR





Ordering information

Parameter	NANOCOLOR® test	Concentration of the standard solution	Confidence interval	Number of tests	REF	
NANOCOLOR Standards						
AOX	0-07	AOX 3	1.0 mg/L AOX	0.8–1.2 mg/L	20	925 07
BOD ₅	8-22	BOD ₅	210 mg/L O ₂	170–250 mg/L	10	925 82
	8-25	BOD ₅ -TT				
Chlorine	1-16	Chlorine	1.00 mg/L Cl ₂	0.90–1.10 mg/L	30	925 17
	0-17	Chlorine / Ozone 2	0.80 mg/L Cl ₂	0.70–0.90 mg/L		
Chromate	0-24	Chromate 5	2.0 mg/L CrO ₄ ²⁻	1.8–2.2 mg/L	15	925 24
	1-25	Chromate	0.40 mg/L CrO ₄ ²⁻	0.36–0.44 mg/L		
COD 60	0-22	COD 60	30 mg/L O ₂	26–34 mg/L	15	925 22
	0-27	COD 40	12 mg/L C	10.0–14.0 mg/L		
	0-93	TOC 25				
COD 160	0-26	COD 160	100 mg/L O ₂	90–110 mg/L	15	925 26
	0-33	COD 300	40 mg/L C	35–45 mg/L		
	0-94	TOC 60				
COD 1500	0-29	COD 1500	400 mg/L O ₂	360–440 mg/L	15	925 29
	0-30	COD 600	160 mg/L C	140–180 mg/L		
	0-99	TOC 600				
COD 15000	0-23	COD 10000	4.00 g/L O ₂	3.60–4.40 g/L	30	925 28
	0-28	COD 15000	4.0 g/L O ₂	3.6–4.4 g/L		
				150		
Nitrite	1-67	Nitrite	0.060 mg/L NO ₂ -N	0.054–0.066 mg/L	15	925 68
	0-68	Nitrite 2	0.30 mg/L NO ₂ -N	0.25–0.35 mg/L		
	0-69	Nitrite 4	2.1 mg/L NO ₂ -N	1.9–2.3 mg/L		
ortho-Phosphate	0-76	ortho and total Phosphate 1	1.00 mg/L PO ₄ -P	0.90–1.10 mg/L	15	925 76
	1-77	ortho Phosphate 1	0.20 mg/L PO ₄ -P	0.18–0.22 mg/L		
Sulfite	0-90	Sulfite 100	50 mg/L SO ₃ ²⁻	45–55 mg/L	15	925 90
NANOCOLOR Multistandards						
NANOCOLOR Multistandard Sewage outflow 1 incl. NANOCOLOR 100+ standard addition				12–120	925 011	
Ammonium	0-04	Ammonium 10	3.0 mg/L NH ₄ -N	2.7–3.3 mg/L		
COD	0-26	COD 160	114 mg/L O ₂	103–125 mg/L		
	0-33	COD 300	114 mg/L O ₂	103–125 mg/L		
Nitrate	0-64	Nitrate 50	6.0 mg/L NO ₃ -N	5.2–6.8 mg/L		
	0-65	Nitrate 8	6.00 mg/L NO ₃ -N	5.20–6.80 mg/L		
total N	0-92	total Nitrogen TN _p 60	30 mg/L N	27–33 mg/L		
total P	0-81	ortho and total Phosphate 5	2.50 mg/L P	2.25–2.75 mg/L		
NANOCOLOR Multistandard Sewage outflow 2 incl. NANOCOLOR 100+ standard addition				12–120	925 010	
Ammonium	0-03	Ammonium 3	1.80 mg/L NH ₄ -N	1.60–2.00 mg/L		
COD	0-27	COD 40	30 mg/L O ₂	26–34 mg/L		
	0-22	COD 60	30 mg/L O ₂	26–34 mg/L		
Nitrate	0-64	Nitrate 50	3.0 mg/L NO ₃ -N	2.6–3.4 mg/L		
	0-65	Nitrate 8	3.00 mg/L NO ₃ -N	2.60–3.40 mg/L		
	1-65	Nitrate	3.0 mg/L NO ₃ -N	2.6–3.4 mg/L		
total N	0-83	total Nitrogen TN _p 22	12.0 mg/L N	10.0–14.0 mg/L		
total P	0-76	ortho and total Phosphate 1	1.00 mg/L P	0.90–1.10 mg/L		
	0-81	ortho and total Phosphate 5	1.00 mg/L P	0.90–1.10 mg/L		
NANOCOLOR Multistandard Sewage inflow incl. NANOCOLOR 100+ standard addition				30–300	925 012	
Ammonium	0-05	Ammonium 50	25 mg/L NH ₄ -N	22–28 mg/L		
COD	0-12	COD 60000	10.0 g/L COD	9.0–11.0 g/L		
	0-29	COD 1500	400 mg/L COD	360–440 mg/L		
	0-30	COD 600	400 mg/L COD	360–440 mg/L		
Nitrate	0-64	Nitrate 50	15.0 mg/L NO ₃ -N	13.5–16.5 mg/L		
	0-66	Nitrate 250	15 mg/L NO ₃ -N	13–17 mg/L		
total N	0-88	total Nitrogen TN _p 220	75 mg/L N	67–83 mg/L		
total P	0-80	ortho and total Phosphate 15	8.00 mg/L P	7.20–8.80 mg/L		

Multistandards can also be used for checking reagents and photometers from other manufacturers.
 The contents of one package of each multistandard are sufficient for at least 1 repeated test of each parameter indicated. If you only check one or a few parameters, then the number of individual determinations is increased.
 Shelf life: 1 year or 6 weeks after opening

Quality control for photometric water analysis

NANOCOLOR

Parameter	NANOCOLOR® test		Concentration of the standard solution	Confidence interval	Number of tests	REF
NANOCOLOR Multistandard Seepage incl. NANOCOLOR 100+ standard addition					15–300	925 013
Ammonium	0-06 0-08	Ammonium 200 Ammonium 100	80 mg/L NH ₄ -N 40 mg/L NH ₄ -N	72–88 mg/L 36–44 mg/L		
COD	0-23 0-28	COD 10000 COD 15000	4.00 g/L COD 4.0 g/L COD	3.60–4.40 g/L 3.6–4.4 g/L		
Nitrate	0-66	Nitrate 250	30 mg/L NO ₃ -N	27–33 mg/L		
total P ortho P	0-55 0-79	ortho and total Phosphate 45 ortho and total Phosphate 50	25.0 mg/L P 25.0 mg/L PO ₄ -P	22.0–28.0 mg/L 22.0–28.0 mg/L		
NANOCOLOR Multistandard Metals 1 incl. NANOCOLOR 100+ standard addition						
Cadmium	1-13 0-14	Cadmium Cadmium 2	0.10 mg/L Cd ²⁺ 1.00 mg/L Cd ²⁺	0.08–0.12 mg/L 0.80–1.20 mg/L		
Chloride	0-19 0-21	Chloride 200 Chloride 50	80 mg/L Cl ⁻ 20 mg/L Cl ⁻	70–90 mg/L 17–23 mg/L		
Chromium		Chromate 5 + total Chromium Chromate 5 + NanOx Metall Chromate + total Chromium	1.0 mg/L Cr 1.0 mg/L Cr 1.0 mg/L Cr	0.8–1.2 mg/L 0.8–1.2 mg/L 0.8–1.2 mg/L		
Fluoride	0-40 1-42	Fluoride 2 Fluoride	1.0 mg/L F ⁻ 1.00 mg/L F ⁻	0.8–1.2 mg/L 0.80–1.20 mg/L		
Iron	1-36 0-37	Iron Iron 3	0.10 mg/L Fe ³⁺ 1.00 mg/L Fe ³⁺	0.08–0.12 mg/L 0.80–1.20 mg/L		
Sulfate	0-86	Sulfate 200	80 mg/L SO ₄ ²⁻	70–90 mg/L		
Zinc	1-95 0-96	Zinc Zinc 4	0.10 mg/L Zn ²⁺ 1.00 mg/L Zn ²⁺	0.08–0.12 mg/L 0.80–1.20 mg/L		
NANOCOLOR Multistandard Metals 2 incl. NANOCOLOR 100+ standard addition						
Copper	1-53 0-54	Copper Copper 7	0.60 mg/L Cu ²⁺ 2.00 mg/L Cu ²⁺	0.50–0.70 mg/L 1.80–2.20 mg/L		
Lead	0-09 1-10	Lead 5 Lead	2.50 mg/L Pb ²⁺ 0.25 mg/L Pb ²⁺	2.25–2.75 mg/L 0.22–0.28 mg/L		
Nickel	0-61 1-62	Nickel 7 Nickel	2.00 mg/L Ni ²⁺ 0.60 mg/L Ni ²⁺	1.80–2.20 mg/L 0.50–0.70 mg/L		
Potassium	0-45	Potassium 50	20 mg/L K ⁺	18–22 mg/L		
NANOCOLOR Multistandard Drinking water incl. NANOCOLOR 100+ standard addition					15–30	925 018
Aluminum	1-02 0-98	Aluminum Aluminum 07	0.50 mg/L Al ³⁺ 0.50 mg/L Al ³⁺	0.44–0.56 mg/L 0.44–0.56 mg/L		
Ammonium	1-05	Ammonium	0.20 mg/L NH ₄ -N	0.17–0.23 mg/L		
Chloride	1-20 0-21	Chloride Chloride 50	20 mg/L Cl ⁻ 20 mg/L Cl ⁻	17–23 mg/L 17–23 mg/L		
Iron	1-36 0-37	Iron Iron 3	1.50 mg/L Fe ³⁺ 1.50 mg/L Fe ³⁺	1.30–1.70 mg/L 1.30–1.70 mg/L		
Manganese	1-60 0-58	Manganese Manganese 10	1.50 mg/L Mn ²⁺ 1.5 mg/L Mn ²⁺	1.30–1.70 mg/L 1.3–1.7 mg/L		
Sulfate	0-86	Sulfate 200	120 mg/L SO ₄ ²⁻	102–138 mg/L		
Multistandards can also be used for checking reagents and photometers from other manufacturers.						
The contents of one package of each multistandard are sufficient for at least 1 repeated test of each parameter indicated. If you only check one or a few parameters, then the number of individual determinations is increased.						
Shelf life: 1 year or 6 weeks after opening						

NANOCOLOR®

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Microbiological tests

Nitrification inhibition tests

Does the biology in your sewage plant work properly?

During aerobic and anaerobic decomposition reactions nitrogen from nitrogen-containing organic substances is first converted to ammonium. The subsequent two-step microbial oxidation of ammonium to nitrate via nitrite is called nitrification. In soil as well as in water it is performed by nitrifying bacteria, a fact which is used for the purification of waste water in sewage plants. Nitrification is an important step during waste water purification in order to keep the concentration of ammonium ions in the effluents of the sewage plant as low as possible. Additionally, nitrification is prerequisite for the denitrification for complete nitrogen elimination, which is required for waste water treatment in many countries.

Proper nitrification and denitrification procedures are important for meeting governmental regulations concerning the nitrogen limits of a sewage plant. Nitrification is a very complex process which depends on many factors. Exceeding allowable limits may have drastic consequences on fees for waste water disposal.

Nitrificants or nitrifying bacteria belong to the group of gram-

negative, chemolithotrophic, aerobic bacteria. One differentiates between the groups of ammonia oxidants and the group of nitrite oxidants. In the first step of the nitrification process the ammonia oxidants oxidize ammonium to nitrite in the presence of oxygen. In the second step the nitrite oxidants transform the nitrite to nitrate, again in the presence of oxygen.

Nitrifying bacteria are very sensitive to certain environmental influences. It is long known, that a number of substances can selectively inhibit nitrification. These substances can reach the sewage plant with the waste water from different sources and significantly, sometimes irreversibly, damage the population of nitrifying bacteria in the activated sludge.

Standard procedures for determination of the nitrification inhibition (e.g. DIN EN ISO 9509 – L38) are very time-consuming, and require lots of experience and work. For this reason it is seldom used in sewage plants, although knowledge about possible effects of sewage influx to the nitrifying bacteria of a sewage plant may help to maintain a proper cleaning process.

The solution for nitrification control

With BioFix® nitrification inhibition tests you can now easily determine the nitrification inhibition in waste waters of all kinds as well as nitrification inhibition by individual substances or substance mixtures.

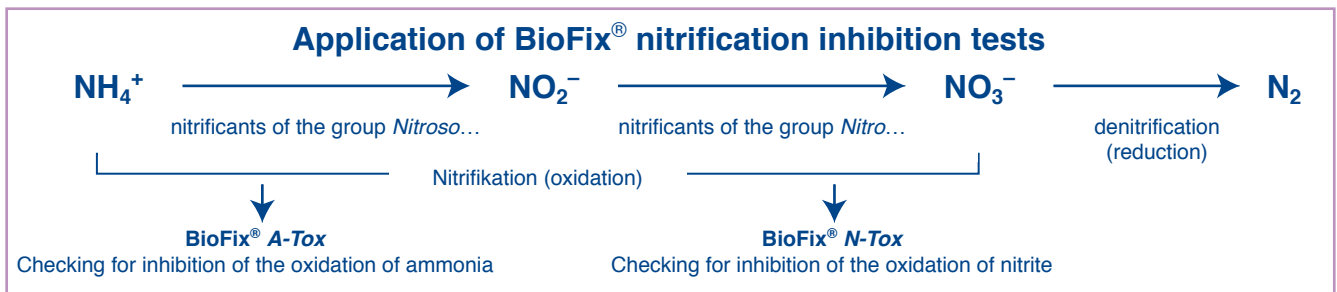
Principle: amperometric measurement of the oxygen consumption

As biomass these tests use nitrifying microorganisms which are typical for sewage plants, preferably Nitrosomonas and Nitrobacter. The bacterial strains are applied as inoculum for the test preparation in defined composition – concerning the precise bacterial strain as well as their concentration – either as pure cultures or as mixed cultures.

Measurement of the metabolic activity of the test organisms is performed with an apparatus for oxygen determination using a commercial oxygen electrode. The result is obtained as % inhibition of the oxygen consumption of the sample solution compared to a non-inhibited control.

BioFix® nitrification inhibition tests allow the following investigations:

- BioFix® *A-Tox*: direct test, whether the first step of the nitrification, the oxidation of ammonium, is inhibited by sample components.
- BioFix® *N-Tox*: direct test, whether the second step of the nitrification, the oxidation of nitrite, is inhibited by sample components.
- Undifferentiated screening test *A/N-Tox* using both BioFix® tests (*A-Tox* and *N-Tox*) to determine, whether nitrification in general is inhibited by sample components.



Please note: BioFix® *A-Tox* and *N-Tox* test kits require cooling during transport and storage!

BioFix® A-Tox/N-Tox

Advantages of BioFix® nitrification inhibition tests are:

- High sensitivity
- Very good reproducibility due to defined bacterial strains used in defined concentrations
- Easy procedure (by far less effort than for the DIN procedure)
- Speed (considerable time-saving: test time 10 min; 4 hours for the DIN test)
- Ready-to-use reagents
- Reagents and preserved bacteria have a shelf life of at least 1 year under the temperatures indicated for storage
- Free-of-charge disposal
- Ability to differentiate between inhibition of the different steps of nitrification (ammonium and/or nitrite oxidation)
- Preserved nitrificants for application in accordance with DIN EN ISO 9509-L38



Ordering information

Type	Field of application	Evaluation of the biological conversion of	Number of tests / pack of	REF
BioFix® A-Tox	1 st step of nitrification	ammonium to nitrite	10–19	970 001
BioFix® N-Tox	2 nd step of nitrification	nitrite to nitrate	10–19	970 002
Starter kit for BioFix® nitrification inhibition tests :			1 Set	970 101
1 electrode adapter which holds the oxygen electrode, 3 x 2 seals for the electrode adapter, 2 mini-magnets for stirring, 1 micro syringe 100 µL, 1 filtration syringe 20 mL				
Preserved nitrificants for application in accordance with DIN EN ISO 9509 – L38				
Reagent BioFix® A-Tox R2, enriched nitrificants for oxidation of ammonia			10 x 2 mL	970 903
Reagent BioFix® N-Tox R2, enriched nitrificants for oxidation of nitrite			10 x 2 mL	970 902
Accessories				
CHROMAFIL® membrane filters, not sterilised, pore size 0.45 µm			50	916 52
Electrode adapter			1	970 111
Special adapter 12 mm for oxygen electrodes with membrane heads type WP ₃ -ST			1	970 116
Seals for the electrode adapter			5 x 2	970 112
Reaction vessels			50	970 113
Magnetic stirring unit without heater			1	970 115
Mini-magnets for stirring			5	970 114

Luminometer BioFix® Lumi-10

BioFix® Lumi-10 is a portable luminometer for the measurement of biological and chemical luminescence reactions with relatively constant light emission. As a mobile test system with a high sensitive detector the BioFix® Lumi-10 is suitable for a wide range of applications:

- Environmental analysis/ecological toxicology: acute and chronic luminous bacteria tests
- Hygiene monitoring: ATP and biomass analysis
- Molecular biological and biochemical diagnostics: Reporter gene assays, NADP(H)-measurements, DNA probe assays, luminescence immunoassays

Modern and flexible

- Battery and mains operable
- High-resolution graphic display
- User language German or English
- Serial RS 232 interface for data transfer to a PC
- Variable measurement times in order to obtain optimum results even in case of weak luminescence

User-friendly

- Data memory for up to 2000 test results
- Selective data administration by means of the location identification digit, sample number, date, time parameters
- 6 individual programme places for user-defined measuring programmes
- Classification of test results by means of previously defined thresholds

Test methods and measurement protocol:


A maximum of 6 different measurement protocols can be issued with an own name and stored with the protocol types and measurement parameters (incubation time, measuring time, limit values, test method, etc.).

The user can distinguish between the following 3 procedures:

- BioTox-S Implementation of luminous bacteria toxicity tests only with the analysis of the final light intensity of the tests.
- BioTox-B Implementation of luminous bacteria toxicity tests with the analysis of initial and final light intensity.
- RLU Evaluation of luminescence tests (e.g. ATP tests, Reporter gene assays) with respect to relative light units (RLU).



Technical data

Detector:	Ultra Fast Single Photon Counter, Spectral wave range 380 – 630 nm
Display:	Illuminated graphic display (128 x 64 dots)
Data storage:	max. 2000 measurements
Humidity:	10 % to 90 % no condensation
Temperature range:	+15 °C to +30 °C
Software:	Microprocessor software, 6 userspecific measurement protocols can be stored
Interface:	RS 232 interface for data transfer to the PC or printer
Power supply:	3 rechargeable batteries: NiCd R14/C/Baby/UM2 batteries; 2500 mAh or with mains power supply: 230 V / 50 Hz, 115 V / 60 Hz
Dimensions:	170 x 150 x 280 mm (H x W x D)
Weight:	2 kg (incl. batteries)
Warranty:	2 years
 This device complies with the following directives: - 2006/95/EC - Low-Voltage Directive - 2004/108/EC - EMC Directive	

Ordering information

Description	REF
BioFix® Lumi-10, for measuring BioFix® Lumi luminous bacteria toxicity tests, for ATP and biomass determinations, reporter gene assays, DNA probe assays and other bioluminescence tests, with integrated software for variable evaluation	940 008
Accessories	
Absorbance color correction cuvettes (pack of 4) with 100 aspirators	940 006
Filter columns and filter tubes for solid phase test (100 each)	945 012
Glass cuvettes, 50 x 12 mm, pack of 672	916 912
Rack for glass cuvettes 12 mm diameter, 5 x 10 positions	945 013
Manual BioFix® Lumi-10, German	940 014
Manual BioFix® Lumi-10, English	940 014.en

Microbiological tests

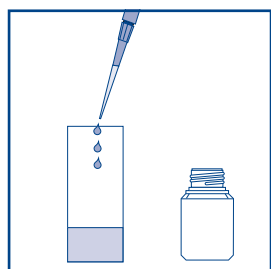
Luminous bacteria toxicity test systems

Luminous bacteria BioFix® Lumi

In contrast to chemical single parameter analysis, luminous bacteria tests are able to evaluate the toxicity of a sample. As an internationally standardised method (EN ISO 11348) it is one of the most important biological tests for toxicity analysis beside the also standardised fish-, daphnia- and algae-tests. For the performance of luminous bacteria tests a wide range of liquid- and freeze-dried products is available.

Luminous bacteria are used as test organisms because of their natural luminescence. In luminous bacteria tests, the marine bacterium *Vibrio fischeri* NRRL B-11177 is used, a halophile, facultative anaerobic, gram-negative rod with polar flagellum. Bioluminescence is a part of the metabolism of these bacteria. Toxic substances influence this sensitive metabolism and inhibit the bioluminescence.

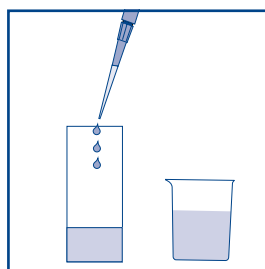
The inhibition of the bacteria's bioluminescence is determined



Sample preparation and reactivation of the bacteria



Measure initial light intensity



Add your sample and wait the indicated time



Measure final light intensity

The pictograms are just an example for a general procedure for Bio Tox-B tests

in a static test by mixing a defined amount of a sample with a luminous bacteria suspension in a cuvette. Subsequently, the inhibition of the luminescence in the sample is determined in comparison to an uninhibited control solution.

The evaluation of the toxicity analysis is performed with the BioFix® Lumi-10, a universal luminometer, which is suitable for portable use.

The BioFix® Lumi allows an easy and rapid toxicity control of environmental samples and offers significant advantages

- Liquid and freeze dried luminous bacteria are available
- Reliable and safe measurement results without high efforts
- Trouble-free disposal
- Suitable for ground-, surface-, seepage- and waste water
- Determination of gene toxic substances

Ordering information

Description	REF
BioFix® Lumi luminous bacteria, freeze-dried, in accordance with DIN EN ISO 11348-3*	
All freeze-dried products are ready-to-use with a shelf life of at least 24 months after production when stored at -20 ± 2 °C. They are shipped in special cooling packages.	
All freeze-dried BioFix® Lumi luminous bacteria are supplied with a certificate of quality in accordance with DIN EN ISO 11348-3.	
20 tubes (1 mL), sufficient for up to 2000 toxicity tests, with reconstitution solution	945 002
10 tubes (1 mL), sufficient for up to 1000 toxicity tests, with reconstitution solution	945 003
20 tubes, sufficient for up to 400 toxicity tests, with medium for freeze-dried luminescent bacteria	945 006
10 tubes, sufficient for up to 200 toxicity tests, with medium for freeze-dried luminescent bacteria	945 007
BioFix® Lumi „Multi-Shot“ luminous bacteria,	945 022
10 tubes for up to 100 toxicity tests, with reactivation and control solution	
BioFix® Lumi „Single-Shot“ luminous bacteria,	945 021
20 tubes for 40 toxicity tests, including the corresponding „Single-Shot“ reactivation and control solution	
BioFix® Lumi luminous bacteria, liquid-dried, in accordance with DIN EN ISO 11348-2*	
All liquid-dried products are ready-to-use with a shelf life of at least 24 months after production when stored at -20 ± 2 °C. They are shipped in special cooling packages.	
All liquid-dried BioFix® Lumi luminous bacteria are supplied with corresponding reactivation solution, sodium chloride standard solution and a certificate of quality in accordance with DIN EN ISO 11348-2.	
10 tubes, sufficient for up to 200 toxicity tests	945 023
20 tubes, sufficient for up to 400 toxicity tests	945 024
10 tubes, sufficient for up to 100 toxicity tests	945 025
BioFix® Lumi auxiliary reagents	
BioFix® Lumi diluent, 1 L	945 601
BioFix® Lumi osmotic adjusting solution, 1 x 50 mL	945 602
BioFix® Lumi reconstitution solution for REF 945 002 and 945 003, 1 L	945 603
BioFix® Lumi diluent for solid phase test, 1L	945 604
BioFix® Lumi medium for freeze-dried luminous bacteria in accordance to DIN EN ISO 11348-3, 1 L	945 608
*All freeze/liquid-dried BioFix® Lumi-10 luminous bacteria are also suited for luminometers of other manufacturers (e.g. LUMIStox, LUMISmini of Dr. Lange, Germany)!	

Microbiological tests

Luminous bacteria toxicity test systems

BioFix® Lumi ATP

With the BioFix® Lumi ATP tests and the luminometer BioFix® Lumi-10 MACHEREY-NAGEL offers a complete system for professional hygienic control of surfaces and liquid samples.

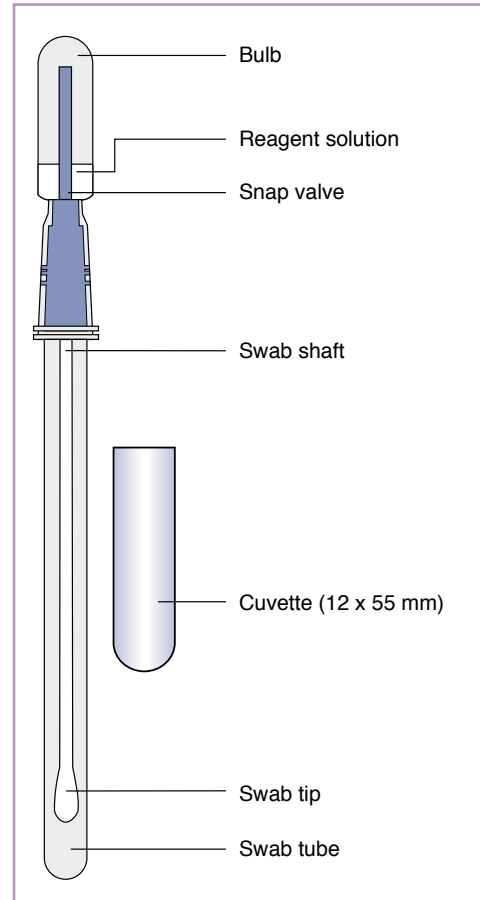
Because of their high sensitivity and extreme easy handling, they are particularly suitable for hygiene monitoring within the scope of HACCP (Hazard Analysis and Critical Control Point) and IFS (International Food Standard) concepts.

Furthermore cleaning processes can be controlled and optimized via the determination of adenosine triphosphate.

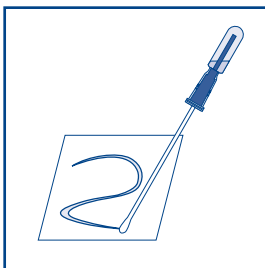
Milk, meat, fish, sausage, preserves, frozen foods, beverages etc: the production of food makes high demands on hygienic conditions. Each contamination leads to a loss of quality of the product or to a loss of time within the production. With the rapid determination of ATP, hygienic impurities on surfaces can easily be detected.

Impurities in boiler and cooling water circulations and other liquid samples can be monitored with BioFix® Lumi ATP for liquid samples.

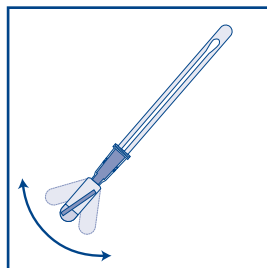
In addition, with the luminometer BioFix® Lumi-10 the user can create individual measurement reports and define cut-off values for an optimal adaption to the requirements of the respective companies.



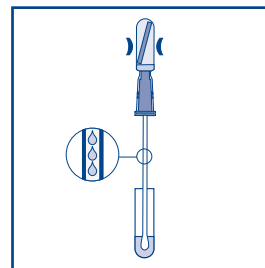
Procedure for hygiene monitoring of surfaces



Sampling



Test activation



Reaction

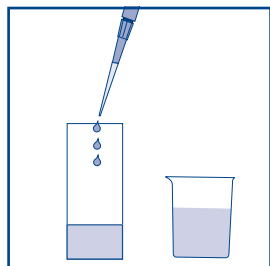


Measurement

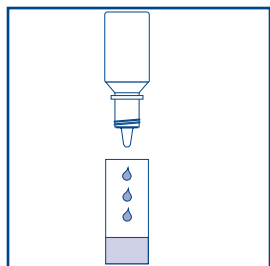
Microbiological tests

Luminous bacteria toxicity test systems

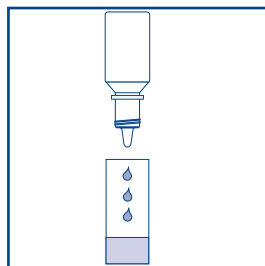
Procedure for hygiene monitoring in liquid samples



Sampling



Extraction



Reaction



Measurement

Ordering information

Type	Description	REF
Test kits for hygiene monitoring of surfaces with the luminometer BioFix® Lumi-10		
Content of these test kits: BioFix® ATP pens, disposable cuvettes 12 x 55 mm, instruction leaflet		
BioFix® Lumi ATP	Rapid test for 25 determinations	946 001
BioFix® Lumi ATP	Rapid test for 50 determinations	946 002
Test kits for hygiene monitoring of surfaces with the luminometer HY-LiTE® of Merck		
Content of these test kits: BioFix® ATP pens, disposable cuvettes 12 x 55 mm, instruction leaflet		
BioFix® Lumi ATP	Rapid test for 25 determinations	946 011
BioFix® Lumi ATP	Rapid test for 50 determinations	946 012
Test kits for monitoring of hygienic impurities and biological contaminations in liquid samples		
Content of this test kit: BioFix® Lumi ATP extraction reagent and bioluminescent reagent, disposable cuvettes 12 x 50 mm, instruction leaflet		
BioFix® Lumi ATP	Rapid test for 100 determinations	946 006

For special analytical tasks, often with special sample matrices which require a specific sample preparation, our R & D department continually develops special instructions. A selection of frequently requested procedures is listed in the following table.

Parameter	Contents of the special instruction
Alcohol	Analysis of alcohol in canned whipped cream with the tube test <i>NANOCOLOR</i> [®] Ethanol
Color of electroplating baths	Checking the color of electroplating baths with MACHERY-NAGEL photometers; determination of the contents of chromium(VI), copper and nickel
Construction materials	Analysis of construction materials with <i>NANOCOLOR</i> [®]
Bromine	Determination of bromine with <i>VISOCOLOR</i> [®] and <i>NANOCOLOR</i> [®] tests for Chlorine
Cadmium	Supplementary purification for test 1-13 Cadmium – removal of interfering colors for cadmium determination
Calcium	Determination of calcium and magnesium in soil with <i>VISOCOLOR</i> [®]
Calcium	Precipitation of high calcium concentrations prior to the determination of metals
Chloride	Determination of chloride in concrete with <i>VISOCOLOR</i> [®]
Chlorophyll	Determination of chlorophyll in natural waters with the <i>NANOCOLOR</i> [®] photometers
Chromate	Determination of water-soluble chromium(VI) in cement with <i>NANOCOLOR</i> [®] or <i>VISOCOLOR</i> [®]
Cooling lubricants	Determination of cooling lubricants with <i>VISOCOLOR</i> [®] Alkalinität AL 7
Cyanide	Determination of cyanides in stone fruit spirits with <i>VISOCOLOR</i> [®]
Cyanide	Determination of total cyanide and easily released cyanide
Dithionite	Determination of dithionite (hydrosulphite) with <i>VISOCOLOR</i> [®]
Electroplating baths, color	Checking the color of electroplating baths with MACHERY-NAGEL photometers; determination of the contents of chromium(VI), copper and nickel
Hardness	Determination of total hardness in the presence of copper
Hydrosulfite	Determination of dithionite (hydrosulphite) with <i>VISOCOLOR</i> [®]
Iron	Determination of iron in hydrochloric acid
Lipophilic substances, non volatile	Determination of non volatile lipophilic substances with test 0-57 <i>NANOCOLOR</i> [®] HC 300
Magnesium	Determination of calcium and magnesium in soil with <i>VISOCOLOR</i> [®]
Phosphate	Determination of phosphate in the presence of larger concentrations of silicic acid with the tube test <i>NANOCOLOR</i> [®] Phosphate 15
Phosphonate	Determination of phosphonates with <i>NANOCOLOR</i> [®] NanOx Metal and <i>VISOCOLOR</i> [®] ECO Phosphate
Sodium	Determination of sodium with <i>VISOCOLOR</i> [®]
Standard tests	Simplification of <i>NANOCOLOR</i> [®] standard test procedures for tests 1-36, 1-48, 1-53, 1-60, 1-62, 1-67 and 1-78
TNT	Photometric determination of TNT in water
Zinc	Determination of zinc in the presence of manganese, iron and calcium with <i>NANOCOLOR</i> [®] test 1-95 and 0-96

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Parameter / subject	Recommended MN product*	Range	REF	Page
A				
Acetic acid	NANOCOLOR® Organic acids 3000	30–3000 mg/L CH ₃ COOH 0.5–50.0 mmol/L CH ₃ COOH	985 050	97, 113
Acid binding capacity	VISOCOLOR® HE Acidity AC 7	0.2–7.0 mmol/L H ⁺	915 006	54, 56
Acid consumption	VISOCOLOR® HE Alkalinity AL 7	0.2–7.0 mmol/L OH ⁻	915 007	54, 56
Acidity of water	VISOCOLOR® HE Acidity AC 7	0.2–7.0 mmol/L H ⁺	915 006	54, 56
Adsorbable organically bounded halogens	NANOCOLOR® AOX 3	0.01–3.0 mg/L AOX	985 007	96, 101, 125
Alcohol	NANOCOLOR® Ethanol 1000	0.10–1.00 g/L 0.013–0.130 Vol. % EtOH	985 838	96, 107
	NANOCOLOR® Methanol 15	0.2–15.0 mg/L MeOH	985 859	97, 111
Alkaline phosphatase in milk	Phosphatesmo MI	qualitative	906 12	37, 42
Alkalinity of cooling lubricants	QUANTOFIX® LubriCheck	15–200 mmol/L KOH	913 36	21, 26
Alkalinity of water (p/m)	QUANTOFIX® Carbonate hardness	3.75–25.00 °e	913 23	21, 23
	VISOCOLOR® alpha Carbonate hardness	1.3–12.5 °e and higher 1 drop = 1.3 °e	935 016	54, 58
	VISOCOLOR® ECO Carbonate hardness	1.3–12.5 °e and higher 1 drop = 1.3 °e	931 014	54, 58
	VISOCOLOR® HE Carbonate hardness C 20	0.63–25.00 °e / 0.2–7.0 mmol/L H ⁺	915 003	54, 58
	NANOCOLOR® Carbonate hardness 15	1.25–18.75 °e / 0.4–5.4 mmol/L H ⁺	985 015	96, 102
Alkalinity of water (total)	VISOCOLOR® Alkalinity AL 7	0.2–7.0 mmol/L OH ⁻	915 007	54, 56
Aluminium	Aluminium test paper	qualitative, > 10 mg/L Al ³⁺	907 21	37, 38
	QUANTOFIX® Aluminium	5–500 mg/L Al ³⁺	931 07	21, 22
	VISOCOLOR® ECO Aluminium	0.10–0.50 mg/L Al ³⁺	931 006	54, 56
	NANOCOLOR® Aluminium 07	0.02–0.70 mg/L Al ³⁺	985 098	96, 100
	NANOCOLOR® Aluminium	0.01–1.00 mg/L Al ³⁺	918 02	98, 100
Amidosulphuric acid	elimination of nitrite interferences		918 973	111, 112
Ammonia, Ammonium	Ammonium test paper	qualitative, > 10 mg/L NH ₄ ⁺	907 22	37, 38
	Ammonia test	0.5–6 mg/L NH ₄ ⁺	907 14	32
	QUANTOFIX® Ammonium	10–400 mg/L NH ₄ ⁺	913 15	21, 22, 31
	VISOCOLOR® ECO Ammonium 15	0.5–15 mg/L NH ₄ ⁺	931 010	54, 57
	VISOCOLOR® alpha Ammonium	0.2–3 mg/L NH ₄ ⁺	935 012	54, 57
	VISOCOLOR® ECO Ammonium 3	0.2–3 mg/L NH ₄ ⁺	931 008	54, 57
	VISOCOLOR® HE Ammonium	0.02–0.50 mg/L NH ₄ ⁺	920 006	54, 57
	NANOCOLOR® Ammonium 200	30–160 mg/L NH ₄ -N	985 006	96, 100
	NANOCOLOR® Ammonium 100	4–80 mg/L NH ₄ -N	985 008	96, 100
	NANOCOLOR® Ammonium 50	1.0–40.0 mg/L NH ₄ -N	985 005	96, 100
	NANOCOLOR® Ammonium 10	0.2–8.0 mg/L NH ₄ -N	985 004	96, 100
	NANOCOLOR® Ammonium 3	0.04–2.30 mg/L NH ₄ -N	985 003	96, 100
NANOCOLOR® Ammonium	0.01–2.0 mg/L NH ₄ -N	918 05	98, 100	
Ammonia oxidation, inhibition	BioFix® nitrification inhibition A-Tox	0–100 % inhibition	970 001	136, 137
Analytical accessories	for the NANOCOLOR® system			128–129
Analytical quality control	NANOCONTROL NANOCHECK, NANOTURB, Standards			130–133
Anionic surfactants	NANOCOLOR® Anionic surfactants 4	0.20–4.00 mg/L MBAS	985 032	97, 118
	NANOCOLOR® Detergents anionic	0.02–5.0 mg/L MBAS	918 32	99, 118
Antimony	Antimony test paper	qualitative, > 5 mg/L Sb ³⁺	907 23	37, 38

* Recommended MN products are arranged by increasing sensitivity

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Parameter / subject	Recommended MN product*	Range	REF	Page
AOX	NANOCOLOR® AOX 3	0.01–3.0 mg/L AOX	985 007	96, 101, 125
Aquarium water	QUANTOFIX® Multistick for aquarium owners	Total hardness 6.25–31.25 °e; Carbonate hardness 3.75–25.00 °e; pH 6.4 – 8.4	913 26, 913 27	21, 29
	VISOCOLOR® alpha		935 ...	
Arsenic, arsine	Arsenic test paper	qualitative, > 0.5 µg As	907 62	37, 38
	QUANTOFIX® Arsenic 50	0.05–3 mg/L As ^{3+/5+}	913 32	21, 22
	QUANTOFIX® Arsenic 10	0.01–0.5 mg/L As ^{3+/5+}	913 34	21, 22
	QUANTOFIX® Arsenic Sensitive	0.05–0.5 mg/L As ^{3+/5+}	913 35	21, 22
Ascorbic acid	QUANTOFIX® Ascorbic acid	50–2000 mg/L vitamin C	913 14	21, 22, 31
ATP test	BioFix® Lumi ATP			140–141
B				
Biochemical oxygen demand	NANOCOLOR® BOD ₅	2–3000 mg/L O ₂	985 822	96, 101, 126
	NANOCOLOR® BOD ₅ -TT (simplified tube test)	0.5–3000 mg/L O ₂	985 825	96, 101, 126
BioFix®	Rapid tests for hygienic monitoring			136–141
BioFix® Lumi	Luminous bacteria toxicity test systems BioFix® Lumi			138–141
Bioluminescence	Luminous bacteria toxicity test systems BioFix® Lumi			138–141
Biotoxicity	Luminous bacteria toxicity test systems BioFix® Lumi			138–141
Bismuth	Bismuth test paper	qualitative, >60 mg/L Bi ³⁺	907 33	37, 38
Blood traces	Peroxtesmo KM	qualitative	906 05	37, 41
BOD ₅	NANOCOLOR® BOD ₅	2–3000 mg/L O ₂	985 822	96, 101, 126
	NANOCOLOR® BOD ₅ -TT (tube test)	0.5–3000 mg/L O ₂	985 825	96, 101, 126
Borates, boric acid	tumeric paper	qualitative, >20 mg/L B	907 47	37, 44
Bromide, Chloride	Saltesmo	0.45–8.8 g/L NaBr	906 08	32, 35
Bromine	with VISOCOLOR® Chlorine tests			59
	with NANOCOLOR® Chlorine tests			101
C				
Cadmium	NANOCOLOR® Cadmium 2	0.05–2.00 mg/L Cd ²⁺	985 014	96, 102
	NANOCOLOR® Cadmium	0.002–0.5 mg/L Cd ²⁺	918 13, 918 131	99, 102
Calcium	QUANTOFIX® Calcium	10–100 mg/L Ca ²⁺	913 24	21, 23
	VISOCOLOR® ECO Calcium	5–50 mg/L Ca ²⁺ and higher 1 drop = 5 mg/L Ca ²⁺	931 012	54, 57
	VISOCOLOR® HE Calcium CA 20	0.75–31.25 °e / 0.1–3.6 mmol/L Ca ²⁺	915 010	54, 57
	NANOCOLOR® Hardness 20	10–100 mg/L Ca ²⁺		96, 108
Carbonate hardness of water	QUANTOFIX® Carbonate hardness	3.75–25.00 °e	913 23	21, 23
	VISOCOLOR® alpha Carbonate hardness	1.3–12.5 °e and higher 1 drop = 1.3 °e	935 016	54, 58
	VISOCOLOR® ECO Carbonate hardness	1.3–12.5 °e and higher 1 drop = 1 °e	931 014	54, 58
	VISOCOLOR® HE Carbonate hardness C 20	0.63–25.00 °e / 0.2–7.2 mmol/L H ⁺	915 003	54, 58
	NANOCOLOR® Carbonate hardness 15	1.25–18.75 °e / 0.4–5.4 mmol/L H ⁺	985 015	96, 102
Carbonic acid	VISOCOLOR® HE Acidity AC 7	0.2–7.0 mmol/L H ⁺	915 006	54, 56

* Recommended MN products are arranged by increasing sensitivity

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Parameter / subject	Recommended MN product*	Range	REF	Page
Cationic surfactants	NANOCOLOR® Cationic surfactants 4	0.20–4.00 mg/L CTAB	985 034	97, 118
	NANOCOLOR® Detergents, cationic	0.05–5.0 mg/L CTAB	918 34	99, 118
Certificate				6
Chemical oxygen demand	NANOCOLOR® COD 60000	5.0–60.0 g/L O ₂	985 012	96, 105
	NANOCOLOR® COD 15000	1.0–15.0 g/L O ₂	985 028	96, 105
	NANOCOLOR® COD 10000	1.00–10.00 g/L O ₂	985 023	96, 105
	NANOCOLOR® COD 4000	400–4000 mg/L O ₂	985 023	96, 105
	NANOCOLOR® COD 1500	100–1500 mg/L O ₂	985 029	96, 105
	NANOCOLOR® COD 600	50–600 mg/L O ₂	985 030	96, 105
	NANOCOLOR® COD 300	50–300 mg/L O ₂	985 033	96, 105
	NANOCOLOR® COD 160	15–160 mg/L O ₂	985 026	96, 104
	NANOCOLOR® COD 160 Hg-free	15–160 mg/L O ₂	963 026	96, 104
	NANOCOLOR® COD 60	5–60 mg/L O ₂	985 022	96, 104
	NANOCOLOR® COD 40	2–40 mg/L O ₂	985 027	96, 104
Chloride	Saltesmo	0.25 – 5 g/L NaCl	906 08	32, 35
	QUANTOFIX® Chloride	500–≥3000 mg/L Cl ⁻	931 21	21, 23
	VISOCOLOR® HE Chloride CL 500	5–500 mg/L Cl ⁻	915 004	54, 58
	VISOCOLOR® ECO Chloride	1–60 mg/L Cl ⁻	931 018	54, 58
	NANOCOLOR® Chloride 200	5–200 mg/L Cl ⁻	985 019	96, 102
	NANOCOLOR® Chloride 50	0.5–50.0 mg/L Cl ⁻	985 021	96, 102
	NANOCOLOR® Chloride	0.2–125 mg/L Cl ⁻	918 20	98, 102
Chloride complexing agents	elimination of interfering chloride during COD measurement		918 911	105, 120
Chloride elimination, cartridges	elimination of interfering chloride during COD and nitrate measurements		918 911	105, 120
Chlorine	Chlortesmo	qualitative, > 1 mg/L chlorine	906 03	37, 38
	Chlorine test	10–200 mg/L Cl ₂	907 09	32, 34
	QUANTOFIX® Chlorine	1–100 mg/L Cl ₂	913 17	21, 23
	QUANTOFIX® Chlorine Sensitive	0.1–10 mg/L Cl ₂	913 39	21, 23
	VISOCOLOR® alpha Chlorine	0.25–2.0 mg/L Cl ₂	935 019	54, 59
	VISOCOLOR® ECO Chlorine 2, free and total	0.1–2.0 mg/L Cl ₂	931 015	54, 59
	VISOCOLOR® ECO free Chlorine 2	0.1–2.0 mg/L Cl ₂	931 016	54, 59
	VISOCOLOR® ECO Chlorine 6, free and total	0.05–6.00 mg/L Cl ₂	931 217	54, 59
	VISOCOLOR® ECO free Chlorine 6	0.05–6.00 mg/L Cl ₂	931 219	54, 59
	VISOCOLOR® HE Chlorine	0.02–0.60 mg/L Cl ₂	920 015	54, 59
	NANOCOLOR® Chlorine / Ozone 2	0.05–2.50 mg/L Cl ₂ / 0.05–2.00 mg/L O ₃	985 017	96, 103
	NANOCOLOR® Chlorine	0.02–10.0 mg/L Cl ₂	918 16	98, 103
		also see swimming pool parameters		
Chlorine dioxide	VISOCOLOR® Chlorine dioxide	<0.2–3.8 mg/L ClO ₂	931 021	54, 60
	NANOCOLOR® Chlorine dioxide 5	0.15–5.00 mg/L ClO ₂	985 018	96, 103
	NANOCOLOR® Chlorine dioxide	0.04–4.00 mg/L ClO ₂	918 163	98, 103
Chlorite	NANOCOLOR® Chlorine dioxide	0.04–4.00 mg/L ClO ₂	918 163	98, 103
Chromate / Chromium(VI)	Chromium test paper	qualitative, > 5 mg/L CrO ₄ ²⁻	907 24	37, 39
	QUANTOFIX® Chromate	3–100 mg/L CrO ₄ ²⁻	931 01	21, 24
	VISOCOLOR® ECO Chromium(VI)	0.02–0.50 mg/L Cr(VI)	931 020	54, 60
	NANOCOLOR® Chromate 5	0.01–4.0 mg/L CrO ₄ ²⁻	985 024	96, 103
	NANOCOLOR® Chromate	0.01–6.0 mg/L CrO ₄ ²⁻	918 25	98, 103
Chromium, total	With NANOCOLOR® Chromate tests and NanOx Metall		918 253	103, 123
Clarification precipitation	NANOCOLOR® Reagents for sample preparation		918 937	113, 120

* Recommended MN products are arranged by increasing sensitivity

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Parameter / subject	Recommended MN product*	Range	REF	Page
Cobalt	Cobalt test paper (qualitative)	>25 mg/L Co ²⁺ / 0.5 % Co	907 28	37, 39
	QUANTOFIX® Cobalt	10–1000 mg/L Co ²⁺	913 03	21, 24
	NANOCOLOR® Cobalt	0.002–0.70 mg/L Co ²⁺	918 51	98, 103
COD	NANOCOLOR® COD 60000	5.0–60.0 g/L O ₂	985 012	96, 105
	NANOCOLOR® COD 15000	1.0–15.0 g/L O ₂	985 028	96, 105
	NANOCOLOR® COD 10000	1.00–10.00 g/L O ₂	985 023	96, 105
	NANOCOLOR® COD 4000	400–4000 mg/L O ₂	985 023	96, 105
	NANOCOLOR® COD 1500	100–1500 mg/L O ₂	985 029	96, 105
	NANOCOLOR® COD 600	50–600 mg/L O ₂	985 030	96, 105
	NANOCOLOR® COD 300	50–300 mg/L O ₂	985 033	96, 105
	NANOCOLOR® COD 160	15–160 mg/L O ₂	985 026	96, 104
	NANOCOLOR® COD 160 Hg-free	15–160 mg/L O ₂	963 026	96, 104
	NANOCOLOR® COD 60	5–60 mg/L O ₂	985 022	96, 104
	NANOCOLOR® COD 40	2–40 mg/L O ₂	985 027	96, 104
COD-free water	for control measurements and dilution		918 993	105, 120
Color of water	NANOCOLOR® Color	5–500 mg/L Pt / 0.2–20.0 1/m	–	98, 106
Complexing agents	QUANTOFIX® EDTA	100–400 mg/L EDTA	913 35	21, 24
	NANOCOLOR® Complexing agents 10	0.5–10.0 mg/L IBic	985 052	97, 106
Cooling lubricants, concentration	QUANTOFIX® LubriCheck	15–200 mmol/L KOH	913 36	21, 26
Cooling lubricants, nitrite content	QUANTOFIX® Nitrate/Nitrite	10–500 mg/L NO ₃ ⁻ , 1–80 mg/L NO ₂ ⁻	913 13	21, 26, 31
	QUANTOFIX® Nitrite	1–80 mg/L NO ₂ ⁻	913 11	21, 26, 31
	QUANTOFIX® Nitrite/pH	1–80 mg/L NO ₂ ⁻ ; pH 6.0 – 9.6	913 38	21, 27
	NANOCOLOR® Nitrite 2	0.02–1.50 mg/L NO ₂ ⁻	985 068	97, 112
	NANOCOLOR® Nitrite	0.005–1.0 mg/L NO ₂ ⁻	918 67	98, 112
Copper	Copper test paper	qualitative, > 20 mg/L Cu ²⁺	907 29	37, 39
	Cuprotesmo	qualitative, > 0.05 µg Cu	906 01	37, 39
	QUANTOFIX® Copper	10–300 mg/L Cu ⁺²⁺	913 04	21, 24
	VISOCOLOR® ECO Copper	0.1–1.5 mg/L Cu ²⁺	931 037	54, 60
	VISOCOLOR® HE Copper	0.04–0.50 mg/L Cu ²⁺	920 050	54, 60
	NANOCOLOR® Copper 7	0.10–7.00 mg/L Cu ²⁺	985 054	96, 106
	NANOCOLOR® Copper	0.01–10.0 mg/L Cu ²⁺	918 53	98, 106
Cyanide	Cyantesmo	qualitative, > 0.2 mg/L HCN	906 04	37, 39
	QUANTOFIX® Cyanide	1–30 mg/L CN ⁻	913 18	21, 24
	VISOCOLOR® ECO Cyanide	0.01–0.20 mg/L CN ⁻	931 022	54, 61
	VISOCOLOR® HE Cyanide	0.002–0.04 mg/L CN ⁻	920 028	54, 61
	NANOCOLOR® Cyanide 08	0.01–0.80 mg/L CN ⁻	985 031	96, 107
	NANOCOLOR® Cyanide	0.001–0.50 mg/L CN ⁻	918 30	98, 107
Cyanuric acid	Cyanuric acid test	50–300 mg/L Cya	907 10	32, 36
	VISOCOLOR® ECO Cyanuric acid	10–100 mg/L Cya	931 023	54, 61

* Recommended MN products are arranged by increasing sensitivity

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D				
DEHA (Diethylhydroxylamine)	<i>VISOCOLOR</i> [®] <i>ECO</i> DEHA	0.01–0.30 mg/L DEHA	931 024	54, 61
	<i>NANOCOLOR</i> [®] DEHA 1	0.05–1.00 mg/L DEHA	985 035	96, 107
Dehydrogenase activity	<i>NANOCOLOR</i> [®] TTC 150	5–150 µg TPF	985 890	97, 119
Detergents, anionic	<i>NANOCOLOR</i> [®] Anionic surfactants 4	0.20–4.00 mg/L MBAS	985 032	97, 118
	<i>NANOCOLOR</i> [®] Detergents anionic	0.02–5.0 mg/L MBAS	918 32	99, 118
Detergents, cationic	<i>NANOCOLOR</i> [®] Cationic surfactants 4	0.20–4.00 mg/L CTAB	985 034	97, 118
	<i>NANOCOLOR</i> [®] Detergents, cationic	0.05–5.0 mg/L CTAB	918 34	99, 118
Detergents, nonionic	<i>NANOCOLOR</i> [®] Nonionic surfactants 15	0.3–15.0 mg/L Triton [®] X-100	985 047	97, 118
Diethylhydroxylamine (DEHA)	<i>VISOCOLOR</i> [®] <i>ECO</i> DEHA	0.01–0.30 mg/L DEHA	931 024	54, 61
	<i>NANOCOLOR</i> [®] DEHA 1	0.05–1.00 mg/L DEHA	985 035	96, 107
Digestion				121
Disinfectants (QUATS)	INDIQUAT indicator papers	semi-quantitative	909 000– 909 002	32, 34
	QUANTOFIX [®] QUAT	20–1000 mg/L benzalkonium chloride	913 37	21, 29
Distilled water	for dilution		918 932	120
Dithionite	special instruction with <i>VISOCOLOR</i> [®] <i>HE</i> Sulfite SU 100			68
E				
EDTA	QUANTOFIX [®] EDTA	100–400 mg/L EDTA	913 35	21, 24
Ethanol	<i>NANOCOLOR</i> [®] Ethanol 1000	0.01–1.00 g/L / 0.013–0.130 Vol. % EtOH	985 838	96, 107
Extraction methods	for <i>NANOCOLOR</i> [®] standard tests			99
F				
Fatty acids	<i>NANOCOLOR</i> [®] Organic acids 3000	30–3000 mg/L CH ₃ COOH 0.5–50.0 mmol/L CH ₃ COOH	985 050	96, 113
Filters	for removal of turbidities and undissolved substances		916 ...	128
Fluoride, hydrogen fluoride	Fluoride test paper	qualitative, >20 mg/L F ⁻	907 50	37, 40
	Fluoride test	2–100 mg/L F ⁻	907 34	32, 34
	<i>VISOCOLOR</i> [®] <i>ECO</i> Fluoride	0.1–2.0 mg/L F ⁻	931 277	54, 62
	<i>NANOCOLOR</i> [®] Fluoride 2	0.1–2.0 mg/L F ⁻	985 040	96, 107
	<i>NANOCOLOR</i> [®] Fluoride	0.05–2.00 mg/L F ⁻	918 142	98, 107
Formaldehyde	QUANTOFIX [®] Formaldehyde	10–200 mg/L HCHO	913 28	21, 25
	<i>NANOCOLOR</i> [®] Formaldehyde 10	0.02–10.00 mg/L HCHO	985 046	96, 108
	<i>NANOCOLOR</i> [®] Formaldehyde 8	0.1–8.0 mg/L HCHO	985 041	96, 108
G				
Glucose	QUANTOFIX [®] Glucose	0–2000 mg/L glucose	913 48	21, 25, 31
Glutaraldehyde	QUANTOFIX [®] Glutaraldehyde	0.5–2.5 % glutaraldehyde	913 43	21, 25
H				
H ₂ O ₂	QUANTOFIX [®] Peroxide 1000	50–1000 mg/L H ₂ O ₂	913 33	21, 28, 31
	QUANTOFIX [®] Peroxide 100	1–100 mg/L H ₂ O ₂	913 12	21, 28, 31
	QUANTOFIX [®] Peroxide 25	0.5–25 mg/L H ₂ O ₂	913 19	21, 28, 31
	<i>NANOCOLOR</i> [®] Peroxide 2	0.03–2.00 mg/L H ₂ O ₂	985 871	97, 114
HACCP	BioFix [®] <i>Lumi</i> ATP		946 ...	140–141

* Recommended MN products are arranged by increasing sensitivity

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Parameter / subject	Recommended MN product*	Range	REF	Page
Hardness of water	AQUADUR® test strips	3.75–31.25 °e / 3.75–26.25 °e / 3.75–17.50 °e	912 01 / 912 20 / 912 39	32, 33
	AQUADUR® Sensitive	0–1.38 °e	912 10	33
	VISOCOLOR® <i>alpha</i> total Hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	935 042	54, 62
	VISOCOLOR® <i>ECO</i> total Hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	931 029	54, 62
	VISOCOLOR® <i>HE</i> total Hardness H 20 F	0.6–25.0 °e / 0.1–3.6 mmol/L Ca ²⁺	915 005	54, 62
	VISOCOLOR® <i>HE</i> total Hardness H 2	0.06–2.50 °e / 0.01–0.36 mmol/L Ca ²⁺	915 002	54, 63
	VISOCOLOR® <i>alpha</i> residual Hardness	0.05–0.38 °e	935 080	54, 63
	NANOCOLOR® Hardness 20	1.25–25.0 °e	985 043	96, 108
	NANOCOLOR® residual Hardness 1	0.03–1.25 °e	985 084	97, 108
Heating blocks	NANOCOLOR® <i>VARIO 4, VARIO C2, VARIO HC</i>		919 300, 919 350, 919 330	92–94
Heavy metals in sludge	NANOCOLOR® Sludge	decomposition with aqua regia	918 50	124
Humidity, relative	Moisture indicator	20–80 % rel. humidity	908 01	32, 34
		8 % rel. humidity	908 901	32, 34
	Moisture indicator without cobalt chloride	8 % rel. humidity	908 903	32, 35
Hydrazine	VISOCOLOR® <i>ECO</i> Hydrazine	0.05–0.40 mg/L N ₂ H ₄	931 030	54, 63
	NANOCOLOR® Hydrazine	0.002–1.50 mg/L N ₂ H ₄	918 44	98, 109
Hydrocarbons	Oil test paper	qualitative	907 60	37, 41
	NANOCOLOR® HC 300	0.5–5.6 mg/L HC in water 30–300 mg/kg HC in soil	985 057	96, 109, 127
Hydrocyanic acid, cyanide	Cyantesmo	qualitative, >0.2 mg/L HCN	906 04	37, 39
	QUANTOFIX® Cyanide	1–30 mg/L CN ⁻	913 18	21, 24
	VISOCOLOR® <i>ECO</i> Cyanide	0.01–0.20 mg/L CN ⁻	931 022	54, 61
	VISOCOLOR® <i>HE</i> Cyanide	0.002–0.04 mg/L CN ⁻	920 028	54, 61
	NANOCOLOR® Cyanide 08	0.01–0.80 mg/L CN ⁻	985 031	96, 107
	NANOCOLOR® Cyanide	0.001–0.50 mg/L CN ⁻	918 30	98, 107
Hydrogen peroxide	QUANTOFIX® Peroxide 1000	50–1000 mg/L H ₂ O ₂	913 33	21, 28, 31
	QUANTOFIX® Peroxide 100	1–100 mg/L H ₂ O ₂	913 12	21, 28, 31
	QUANTOFIX® Peroxide 25	0.5–25 mg/L H ₂ O ₂	913 19	21, 28, 31
	NANOCOLOR® Peroxide 2	0.03–2.00 mg/L H ₂ O ₂	985 871	114
Hydrosulfite	special instructions with VISOCOLOR® <i>HE</i> Sulfite SU 100			68
Hygiene control	BioFix® <i>Lumi</i> ATP		946 ...	140–141
I				
Internal quality control	NANOCOLOR® T-Set		919 917	95
	NANOCONTROL system		925 ...	130–133
Iodide	Saltesmo	0.7–14.2 g/L KI	906 08	32, 35
IQC	NANOCOLOR® T-Set		919 917	95
	NANOCONTROL system		925 ...	130–133
Iron, divalent	Dipyridyl paper	qualitative, >2 mg/L Fe ²⁺	907 25	37, 39

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Iron, di- and trivalent	Iron test paper	qualitative, > 10 mg/L Fe ^{2+/3+}	907 26	37, 40
	QUANTOFIX® Total iron 1000	5–1000 mg/L Fe ^{2+/3+}	913 30	21, 25
	QUANTOFIX® Total iron 100	2–100 mg/L Fe ^{2+/3+}	913 44	21, 25
	VISOCOLOR® ECO Iron 2	0.04–1.0 mg/L Fe	931 026	54, 63
	VISOCOLOR® ECO Iron 1	0.04–1.0 mg/L Fe	931 025	54, 63
	VISOCOLOR® HE Iron	0.01–0.20 mg/L Fe	920 040	54, 63
	NANOCOLOR® Iron 3	0.02–3.00 mg/L Fe	985 037	97, 109
	NANOCOLOR® Iron	0.01–15.00 mg/L Fe	918 36	98, 109
Isobutyl methyl ketone	For color extraction of NANOCOLOR® Phenolic index 5		918 929	114, 120
L				
Lactoperoxidase	Peroxtesmo MI	qualitative	906 27	37, 42
Lead	Plumbtesmo	qualitative < 5 mg/L Pb ²⁺ / 0.05 µg Pb	906 02	37, 42
	NANOCOLOR® Lead 5	0.10–5.00 mg/L Pb ²⁺	985 009	97, 110
	NANOCOLOR® Lead	0.005–1.00 mg/L Pb ²⁺	918 10	99, 110
Lime precipitation	NANOCOLOR® reagents for lime precipitation		918 939	106, 111, 120
Lipophilic substances	NANOCOLOR® HC 300	0.5–5.6 mg/L HC in water; 30–300 mg/kg HC in soil	985 057	96, 109, 127
Luminometer	BioFix® Lumi-10		940 008	138, 139
Luminous bacteria	BioFix® Luminous bacteria toxicity test systems		940 ..., 945 ...	139–141
M				
m value (alkalinity)	VISOCOLOR® HE Carbonate hardness C 20	0.63–25.00 °e / 0.2–7.0 mmol/L H ⁺	915 003	54, 58
Magnesium	indirect determination with VISOCOLOR®			64
	NANOCOLOR® Hardness 20	5–50 mg/L Mg ²⁺	985 043	96, 108
Manganese	VISOCOLOR® ECO Manganese	0.1–1.5 mg/L Mn	931 038	54, 64
	VISOCOLOR® HE Manganese	0.03–0.50 mg/L Mn	920 055	55, 64
	NANOCOLOR® Manganese 10	0.02–10.0 mg/L Mn	985 058	97, 110
	NANOCOLOR® Manganese	0.01–10.0 mg/L Mn	918 60	98, 110
Mastitis with milk-giving animals	Udder test paper	qualitative	907 48	37, 44
Material safety data sheets				6
Membrane filters	for removal of turbidities and undissolved substances		916 ...	128
Methanol	NANOCOLOR® Methanol 15	0.2–15.0 mg/L MeOH	985 859	97, 111
Molybdenum	QUANTOFIX® Molybdenum	5–250 mg/L Mo(VI)	913 25	21, 26
	NANOCOLOR® Molybdenum 40	1.0–40.0 mg/L Mo(VI)	985 056	97, 111
Multiteststicks	QUANTOFIX® Multisticks for aquarium owners	Total hardness 6.25–31.25 °e; carbonate hardness 3.75– 25.00 °e; pH 6.4–8.4	913 26	21, 29
	Swimming Pool Test 3 in 1	0.5–10 mg/L Cl ₂ ; pH 6.4–8.4; 80–240 mg/L CaCO ₃	907 52	32, 36
	Swimming Pool Test 5 in 1	0–100 mg/L CaCO ₃ ; 0.5–10 mg/L Cl ₂ ; 0–10 mg/L Cl ₂ ; 80–240 mg/L CaCO ₃ ; pH 6.4–8.4	907 59	32, 36
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N				
NanOx Metal	reagents for oxidative decomposition of heavy metal samples and determination of total phosphorus with microwave oven or heating block		918 978	122, 123
NanOx N	reagents for determination of total nitrogen with microwave oven or heating block		918 979	121
Nickel	Nickel test paper	qualitative, > 10 mg/L Ni ²⁺	907 30	37, 40
	QUANTOFIX® Nickel	10–1000 mg/L Ni ²⁺	913 05	21, 26
	VISOCOLOR® ECO Nickel	0.1–1.5 mg/L Ni ²⁺	931 040	55, 64
	NANOCOLOR® Nickel 7	0.02–7.00 mg/L Ni ²⁺	985 061	97, 111
	NANOCOLOR® Nickel	0.01–10.0 mg/L Ni ²⁺	918 62	98, 111
Nitrate	Nitratesmo	10 mg/L NO ₃ ⁻ ; 5 mg/L NO ₂ ⁻	906 11	37, 41
	QUANTOFIX® Nitrate/Nitrite	10–500 mg/L NO ₃ ⁻ ; 1–80 mg/L NO ₂ ⁻	913 13	21, 26, 31
	VISOCOLOR® alpha Nitrate	2–50 mg/L NO ₃ ⁻	935 065	55, 64
	VISOCOLOR® ECO Nitrate	1–120 mg/L NO ₃ ⁻	931 041	55, 64
	NANOCOLOR® Nitrate 250	4–60 mg/L NO ₃ -N	985 066	98, 112
	NANOCOLOR® Nitrate	0.9–30.0 mg/L NO ₃ -N	918 65	98, 112, 121
	NANOCOLOR® Nitrate 8	0.30–8.00 mg/L NO ₃ -N	985 065	97, 112,
	NANOCOLOR® Nitrate 50	0.3–22.0 mg/L NO ₃ -N	985 064	97, 112, 121
Nitrate and Nitrite	Nitratesmo	10 mg/L NO ₃ ⁻ ; 5 mg/L NO ₂ ⁻	906 11	37, 41
	QUANTOFIX® Nitrate/Nitrite	10–500 mg/L NO ₃ ⁻ ; 1–80 mg/L NO ₂ ⁻	913 13	21, 26, 31
Nitrificants, preserved	for application in accordance with DIN EN ISO 9509-L38		970 902, 970 903	137
Nitrification inhibition tests	BioFix® A-Tox and N-Tox	0–100 % inhibition	970 001, 970 002	136–137
Nitrite	Potassium iodide starch paper	qualitative	907 53	37, 43
	Nitratesmo	10 mg/L NO ₃ ⁻ ; 5 mg/L NO ₂ ⁻	906 11	37, 41
	QUANTOFIX® Nitrite 3000	0.1–3 g/L NO ₂ ⁻	913 22	21, 27
	QUANTOFIX® Nitrite	1–80 g/L NO ₂ ⁻	913 11	21, 26, 31
	QUANTOFIX® Nitrate/Nitrite	10–500 mg/L NO ₃ ⁻ ; 1–80 mg/L NO ₂ ⁻	913 13	21, 26, 31
	VISOCOLOR® alpha Nitrite	0.05–1.0 mg/L NO ₂ ⁻	935 066	55, 65
	VISOCOLOR® ECO Nitrite	0.02–0.5 mg/L NO ₂ ⁻	931 044	55, 65
	VISOCOLOR® HE Nitrite	0.005–0.10 mg/L NO ₂ ⁻	920 063	55, 65
	NANOCOLOR® Nitrite 4	0.1–4.0 mg/L NO ₂ -N	985 069	97, 112
	NANOCOLOR® Nitrite 2	0.003–0.460 mg/L NO ₂ -N	985 068	97, 112
NANOCOLOR® Nitrite	0.005–1.0 mg/L NO ₂ ⁻	918 67	98, 112	
Nitrite oxidation, inhibition	BioFix® N-Tox	0–100 % inhibition	970 002	136–137
Nitrogen (total)	NANOCOLOR® total Nitrogen TN ₀ 22	0.5–22.0 mg/L N	985 083	97, 113, 121
	NANOCOLOR® total Nitrogen TN ₀ 60	3–60 mg/L N	985 092	97, 113, 121
	NANOCOLOR® total Nitrogen TN ₀ 220	5–220 mg/L N	985 088	97, 113, 121

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Nitrous acid, nitrite	Potassium iodide starch paper	qualitative	907 53	37, 43
	Nitratesmo	10 mg/L NO ₃ ⁻ ; 5 mg/L NO ₂ ⁻	906 11	37, 41
	QUANTOFIX® Nitrite 3000	0.1–3 g/L NO ₂ ⁻	913 22	21, 27
	QUANTOFIX® Nitrite	1–80 g/L NO ₂ ⁻	913 11	21, 26, 31
	VISOCOLOR® alpha Nitrite	0.05–1.0 mg/L NO ₂ ⁻	935 066	55, 65
	VISOCOLOR® ECO Nitrite	0.02–0.5 mg/L NO ₂ ⁻	931 044	55, 65
	VISOCOLOR® HE Nitrite	0.005–0.10 mg/L NO ₂ ⁻	920 063	55, 65
	NANOCOLOR® Nitrite 4	0.1–4.0 mg/L NO ₂ -N	985 069	97, 112
	NANOCOLOR® Nitrite 2	0.003–0.460 mg/L NO ₂ -N	985 068	97, 112
NANOCOLOR® Nitrite	0.005–1.0 mg/L NO ₂ ⁻	918 67	98, 112	
Nonionic surfactants	NANOCOLOR® Nonionic surfactants 15	0.3–15.0 mg/L Triton® X-100	985 047	97, 118
Nutrient mixture	For BOD ₅ determination			126
O				
Oil in water or in soil	Oil test paper	qualitative	907 60	37, 41
	NANOCOLOR® HC 300	0.5–5.6 mg/L HC in water, 30–300 mg/kg HC in soil	985 057	96, 127
Organic acids	NANOCOLOR® Organic acids 3000	30–3000 mg/L CH ₃ COOH	985 050	97, 113
Oxidative decompositions	Crack set (acid oxidation of aqueous systems in a heating block)		918 08	124
	NANOCOLOR® NanOx		918 979, 918 978	121–123
	NANOCOLOR® Sludge (decomposition with aqueous systems in a heating block for determination of metals in sludge or soil)		918 50	124
Oxygen in water	VISOCOLOR® ECO Oxygen	1–10 mg/L O ₂	931 088	55, 65
	VISOCOLOR® HE Oxygen SA 10	0.2–10.0 mg/L O ₂	915 009	55, 65
	NANOCOLOR® Oxygen 12	0.5–12.0 mg/L O ₂	985 082	97, 113
Ozone	Ozone test strips	orienting measurement in air	907 36	32, 35
	Potassium iodide starch paper	qualitative	907 53	37, 43
	NANOCOLOR® Chlorine/Ozone 2	0.05–2.00 mg/L O ₃	985 017	96, 103
P				
p value	VISOCOLOR® HE Carbonate hardness C 20	0.63–25.00 °e	915 003	54, 58
Peracetic acid	QUANTOFIX® Peracetic acid 50	0–50 mg/L PAA	913 40	21, 27, 31
	QUANTOFIX® Peracetic acid 500	50–500 mg/L PAA	913 41	21, 27, 31
	QUANTOFIX® Peracetic acid 2000	500–2000 mg/L PAA	913 42	21, 27, 31
Peroxidase in blood traces	Peroxtesmo KM	qualitative	906 05	37, 41
Peroxidase in food	Peroxtesmo KO	qualitative	906 06	37, 41
Peroxidase in milk	Peroxtesmo MI	qualitative	906 27	37, 41
Peroxides	QUANTOFIX® Peroxide 1000	50–1000 mg/L H ₂ O ₂	913 33	21, 28, 31
	QUANTOFIX® Peroxide 100	1–100 mg/L H ₂ O ₂	913 12	21, 28, 31
	QUANTOFIX® Peroxide 25	0.5–25 mg/L H ₂ O ₂	913 19	21, 28, 31
	NANOCOLOR® Peroxide 2	0.03–2.00 mg/L H ₂ O ₂	985 871	97, 114

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pH	Indicator papers without color scale	Brilliant yellow paper	907 01	20
		Congo paper	907 02 – 907 05	20
		Litmus paper	911 ...	20
		Nitrazine yellow paper	907 11	20
		Phenolphthalein paper	907 12 / 907 13	20
	Indicator papers with color scale	Duotest	903 ...	19
		Special indicator papers	902 ...	18
		Tritest	905 ...	19
		Universal indicator papers	902 ...	18
	especially for colored solutions	PEHANON®	904 ...	17
		VISOCOLOR® ECO pH	931 066	55, 66
	especially for weakly buffered solutions	pH-Fix test strips	921 ...	16
		UNISOL® liquid indicators	910 02, 910 31	20
		VISOCOLOR® alpha pH	935 075	55, 66
		VISOCOLOR® ECO pH	931 066	55, 66
especially for unbuffered solutions	VISOCOLOR® HE pH	920 074	55, 66	
photometric	VISOCOLOR® ECO pH 6.0–8.2	931 270	55, 66	
	NANOCOLOR® pH 6.5–8.2	918 72	97, 114	
pH value in cooling lubricants	QUANTOFIX® Nitrite / pH	1–80 mg/L NO ₂ ⁻ ; pH 6.0–9.6	913 38	21, 27
pH value in photographic solutions	Ag-Fix test strips	0.5–10 g/L Ag ⁺ , pH 4–8	907 41	32
Phenols	NANOCOLOR® Phenolic index 5	0.2–5.0 mg/L Phenol	985 074	97, 114
	NANOCOLOR® Phenol	0.01–7.0 mg/L Phenol	918 75	98, 114
Phosphatase, acid	Phosphatesmo KM	qualitative	906 07	37, 42
Phosphatase, alkaline	Phosphatesmo MI	qualitative	906 12	37, 42
Phosphate, ortho	QUANTOFIX® Phosphate	3–100 mg/L PO ₄ ³⁻	913 20	21, 28
	VISOCOLOR® alpha Phosphate	2–20 mg/L PO ₄ ³⁻	935 079	55, 66
	VISOCOLOR® ECO Phosphate	0.2–5 mg/L PO ₄ -P	931 084	55, 66
	VISOCOLOR® HE Phosphate	0.05–1.0 mg/L P	920 082	55, 66
	VISOCOLOR® HE Phosphate (DEV)	0.01–0.25 mg/L P	920 080	55, 67
	NANOCOLOR® ortho Phosphate	0.5–50 mg/L PO ₄ ³⁻	918 78	98, 115, 122
	NANOCOLOR® ortho Phosphate	0.1–20 mg/L PO ₄ ³⁻	918 77	98, 115, 122
Phosphate, ortho and total	NANOCOLOR® Phosphate 50	10.0–50.0 mg/L P	985 079	97, 115, 122
	NANOCOLOR® Phosphate 45	5.0–50.0 mg/L P	985 055	97, 115, 122
	NANOCOLOR® Phosphate 15	0.30–15.00 mg/L P	985 080	97, 115, 122
	NANOCOLOR® Phosphate 5	0.20–5.00 mg/L P	985 081	97, 115, 122
	NANOCOLOR® Phosphate 1	0.01–1.50 mg/L P	985 076	97, 115
Phosphonate	with NanOx Metal and VISOCOLOR® ECO Phosphate			66
Photometers	Compact photometer PF-12		919 05	74–78
	NANOCOLOR® 500 D		919 500	89–91
	Spectrophotometers NANOCOLOR® UV/VIS and NANOCOLOR® VIS		919 100, 919 150	84–87

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Piston pipettes			916 ...	128
POC (Polyoxycarboxylic acids)	NANOCOLOR® POC 200	1.0–200 mg/L POC	985 070	97, 116
Potassium	Potassium test paper	qualitative, >250 mg/L K ⁺	907 27	37, 43
	QUANTOFIX® Potassium	200–1500 mg/L K ⁺	913 16	21, 28
	VISOCOLOR® ECO Potassium	2–15 mg/L K ⁺	931 032	55, 67
	NANOCOLOR® Potassium 50	2–50 mg/L K ⁺	985 045	97, 116
Protein residues on surfaces	INDIPRO	qualitative	907 65	37, 40
Q				
Quality control	NANOCOLOR® T-Set		919 917	95
	NANOCONTROL system		925 ...	130–133
Quaternary ammonium compounds	INDIQUAT® indicator paper	semi-quantitative	909 000 – 909 002	32, 34
	QUANTOFIX® QUAT	20–1000 mg/L benzalkonium chloride	913 37	21, 29
R				
Residual hardness of water	VISOCOLOR® HE total Hardness H 2	0.06–2.50 °e / 0.01–0.36 mmol/L Ca ²⁺	915 002	54, 63
	VISOCOLOR® alpha residual Hardness	0.05–0.38 °e	935 080	54, 63
	NANOCOLOR® residual Hardness 1	0.03–1.25 °e	985 084	97, 108
S				
Silica, silicon	VISOCOLOR® ECO Silica	0.2–3.0 mg/L SiO ₂	931 033	55, 67
	VISOCOLOR® HE Silicon	0.01–0.30 mg/L Si	920 087	55, 67
	NANOCOLOR® Silica	0.005–10.0 mg/L SiO ₂	918 48	98, 116
Silica-free water	for silicate determination		918 912	116, 120
Silver	Silver test paper	qualitative, >20 mg/L Ag ⁺	907 32	37, 43
	NANOCOLOR® Silver 3	0.20–3.00 mg/L Ag ⁺	985 049	97, 116
Silver in photographic solutions	Ag-Fix test strips	0.5–10 g/L Ag ⁺	907 41	32
Sludge activity	NANOCOLOR® TTC	5–150 µg TPF	985 890	97, 119
Sludge (heavy metals)	NANOCOLOR® Sludge	decomposition with aqua regia	918 50	124
Sodium	possible with VISOCOLOR® special instruction			68
Spectrophotometer	NANOCOLOR® ^{UV} / _{VIS}		919 100	84–87
	NANOCOLOR® VIS		919 150	84–87
Sperm (acid phosphatase)	Phosphatesmo KM	qualitative	906 07	37, 42
Standard solutions	NANOCONTROL Standards		925 ...	131–133
Starch	NANOCOLOR® Starch 100	5–100 mg/L starch	985 085	97, 117
Sulfate	QUANTOFIX® Sulfate	<200 – >1600 mg/L SO ₄ ²⁻	913 29	21, 29, 31
	VISOCOLOR® Sulfate	25–200 mg/L SO ₄ ²⁻	914 035	68
	NANOCOLOR® Sulfate 1000	200–1000 mg/L SO ₄ ²⁻	985 087	97, 117
	NANOCOLOR® Sulfate 200	10–200 mg/L SO ₄ ²⁻	985 086	97, 117
Sulfide, hydrogen sulfide	Lead acetate paper	qualitative, >5 mg/L S ⁻	907 44	37, 40
	Sulfide test paper	qualitative, >5 mg/L S ⁻	907 61	37, 43
	VISOCOLOR® ECO Sulfide	0.1–0.8 mg/L S ²⁻	931 094	55, 68
	NANOCOLOR® Sulfide 3	0.05–3.00 mg/L S ²⁻	985 073	98, 117
	NANOCOLOR® Sulfide	0.01–3.0 mg/L S ²⁻	918 88	98, 117

* Recommended MN products are arranged by increasing sensitivity

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Parameter/subject	Recommended MN product*	Range	REF	Page
Sulfite, sulfurous acid	Potassium iodate starch paper	qualitative	907 53	37, 43
	Sulfite test paper	qualitative, > 10 mg/L Na ₂ SO ₃ ²⁻	907 63	37, 44
	QUANTOFIX® Sulfite	10–1000 mg/L SO ₃ ²⁻	913 06	21, 29
	VISOCOLOR® ECO Sulfite	1 drop = 1 mg/L SO ₃ ²⁻	931 095	55, 68
	VISOCOLOR® HE Sulfite SU 100	2–100 mg/L SO ₃ ²⁻	915 008	55, 68
	NANOCOLOR® Sulfite 100	5–100 mg/L SO ₃ ²⁻	985 090	97, 118
	NANOCOLOR® Sulfite 10	0.05–10.0 mg/L SO ₃ ²⁻	985 089	97, 118
Sulfurous acid, sulfite	Potassium iodate starch paper	qualitative	907 53	37, 43
	Sulfite test paper	qualitative, > 10 mg/L Na ₂ SO ₃ ²⁻	907 63	37, 44
	QUANTOFIX® Sulfite	10–1000 mg/L SO ₃ ²⁻	913 06	21, 29
	VISOCOLOR® ECO Sulfite	1 drop = 1 mg/L SO ₃ ²⁻	931 095	55, 68
	VISOCOLOR® HE Sulfite SU 100	2–100 mg/L SO ₃ ²⁻	915 008	55, 68
	NANOCOLOR® Sulfite 100	5–100 mg/L SO ₃ ²⁻	985 090	97, 118
	NANOCOLOR® Sulfite 10	0.05–10.0 mg/L SO ₃ ²⁻	985 089	97, 118
Surfaces, hygiene control	BioFix® Lumi ATP		946 ...	140–141
Surfaces, protein contamination	INDIPRO	qualitative	907 65	37, 40
Surfactants	NANOCOLOR® Anionic surfactants 4	0.20–4.00 mg/L MBAS	985 032	97, 118
	NANOCOLOR® Detergents anionic	0.02–5.0 mg/L MBAS	918 32	99, 118
	NANOCOLOR® Cationic surfactants 4	0.20–4.00 mg/L CTAB	985 034	97, 118
	NANOCOLOR® Detergents cationic	0.05–5.0 mg/L CTAB	918 34	99, 118
	NANOCOLOR® nonionic surfactants 15	0.3–15.0 mg/L Triton® X-100	985 047	97, 118
Swimming pool parameters	Swimming Pool Test 3 in 1	0.5–10 mg/L Cl ₂ ; pH 6.4–8.4; 80–240 mg/L CaCO ₃	907 52	32, 36
	Swimming Pool Test 5 in 1	100–1000 mg/L CaCO ₃ ; 0.5–10 mg/L Cl ₂ ; 1–10 mg/L Cl ₂ ; pH 6.4–8.4; 80–240 mg/L CaCO ₃	907 59	32, 36
	VISOCOLOR® ECO Swimming pool	0.1–2.0 mg/L Cl ₂ ; pH 6.9–8.2	931 090	55, 69
	Cyanuric Acid Test	0–300 mg/L Cya	907 10	32, 36
T				
Tab equipment for beverages	BioFix® Lumi ATP		946 ...	140–141
Thiocyanate	NANOCOLOR® Thiocyanate 50	0.5–50.0 mg/L SCN ⁻	985 091	97, 119
Tin	QUANTOFIX® Tin	10–500 mg/L Sn ²⁺	913 09	21, 29
	NANOCOLOR® Tin 3	0.10–3.00 mg/L Sn	985 097	97, 119
TN _b	NANOCOLOR® total Nitrogen TN _b 22	0.5–22.0 mg/L N	985 083	97, 113, 121
	NANOCOLOR® total Nitrogen TN _b 60	3–60 mg/L N	985 092	97, 113, 121
	NANOCOLOR® total Nitrogen TN _b 220	5–220 mg/L N	985 088	97, 113, 121
TOC	NANOCOLOR® TOC 25	2.0–25.0 mg/L TOC	985 093	97, 119
	NANOCOLOR® TOC 60	10–60 mg/L TOC	985 094	97, 119
	NANOCOLOR® TOC 600	40–600 mg/L TOC	985 099	97, 119
Total alkalinity	VISOCOLOR® HE Alkalinity AL 7	0.2–7.0 mmol/L OH ⁻	915 007	54, 56
* Recommended MN products are arranged by increasing sensitivity				

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Total hardness of water	AQUADUR® test strips	3.75–31.25 °e / 3.75–26.25 °e / 3.75–17.50 °e	912 01 / 912 20 / 912 39	32, 33
	AQUADUR® Sensitive	0–1.38 °e	912 10	33
	VISOCOLOR® <i>alpha</i> Hardness	1 drop \triangle 1.25 °e \triangle 17.8 mg/L CaCO ₃	935 042	54, 62
	VISOCOLOR® ECO Hardness	1 drop \triangle 1.25 °e \triangle 17.8 mg/L CaCO ₃	931 029	54, 62
	VISOCOLOR® HE Hardness H 20 F	0.6–25.0 °e / 0.1–3.6 mmol/L Ca ²⁺	915 005	54, 62
	VISOCOLOR® HE Hardness H 2	0.06–2.5 °e / 0.01–0.36 mmol/L Ca ²⁺	915 002	54, 63
	VISOCOLOR® <i>alpha</i> residual Hardness	0.05–0.38 °e	935 080	54, 63
	NANOCOLOR® Hardness 20	1.25–25.0 °e	985 043	96, 108
	NANOCOLOR® residual Hardness 1	0.03–1.25 °e	985 084	97, 108
	Total nitrogen	NANOCOLOR® total Nitrogen TN _b 22	0.5–22.0 mg/L N	985 083
NANOCOLOR® total Nitrogen TN _b 60		3–60 mg/L N	985 092	97, 113, 121
NANOCOLOR® total Nitrogen TN _b 220		5–220 mg/L N	985 088	97, 113, 121
Total phosphorus	NANOCOLOR® Phosphate tests and decomposition with <i>NanOx</i> Metal			122
Toxicity control	Luminous bacteria toxicity test system BioFix® <i>Lumi</i>		940 ..., 945 ...	139–141
	BioFix® <i>A-Tox</i> and <i>N-Tox</i> nitrification inhibition tests	0–100 % inhibition	970 001, 970 002	136–137
TTC / Sludge activity	NANOCOLOR® TTC 150	5–150 µg TPF	985 890	97, 119
Turbidity of water	NANOCOLOR® Turbidity	1–100 TE/F/ 0.5–40.0 1/m	–	98, 120
		1–1000 NTU	–	98, 120
U				
Udder diseases	Udder test apaper	qualitative	907 48	37, 44
V				
Vat dye conversion, endpoint	Indanthrene yellow paper	qualitative	907 51	37, 40

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W				
Water hardness	AQUADUR® test strips	3.75–31.25 °e / 3.75–26.25 °e / 3.75–17.50 °e	912 01 / 912 20 / 912 39	32, 33
	AQUADUR® Sensitive	0–1.38 °e	912 10	33
	VISOCOLOR® <i>alpha</i> Hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	935 042	54, 62
	VISOCOLOR® <i>ECO</i> Hardness	1 drop \triangleq 1.25 °e \triangleq 17.8 mg/L CaCO ₃	931 029	54, 62
	VISOCOLOR® <i>HE</i> Hardness H 20 F	0.6–25.0 °e / 0.1–3.6 mmol/L Ca ²⁺	915 005	54, 62
	VISOCOLOR® Hardness H 2	0.06–2.5 °e / 0.01–0.36 mmol/L Ca ²⁺	915 002	54, 63
	VISOCOLOR® <i>alpha</i> residual Hardness	0.05–0.38 °e	935 080	54, 63
	NANOCOLOR® Hardness 20	1.25–25.0 °e	985 043	96, 108
	NANOCOLOR® residual Hardness 1	0.03–1.25 °e	985 084	97, 108
Water in butter	Water indicator paper	qualitative	906 10	37, 45
Water in organic solvents	Watesmo indicator paper	qualitative	906 09	37, 44
Water in petrol and fuel oil tanks	AQUATEC test strips	qualitative	907 42	37, 38
Z				
Zinc	QUANTOFIX® Zinc	2–100 mg/L Zn ²⁺	913 10	21, 29
	VISOCOLOR® <i>ECO</i> Zinc	0.5–3 mg/L Zn ²⁺	931 098	55, 69
	NANOCOLOR® Zinc 4	0.10–4.00 mg/L Zn ²⁺	985 096	97, 120
	NANOCOLOR® Zinc	0.02–3.0 mg/L Zn ²⁺	918 95	98, 120
Zirconium	Zirconium test paper	qualitative, > 20 mg/L Zr ⁴⁺	907 21	37, 45
* Recommended MN products are arranged by increasing sensitivity				

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