… precision for all-purpose use

Straightforward measuring!

Depending on your application, WTW offers the appropriate photometer and the appropriate test sets. Photometers and tests are perfectly matched to each other. The methods for all test sets are stored in the photometers.

Cuvette tests without bar code

Powder tests

Small but nice – the powder tests for field use

p. 92

pHotoFlex

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Cases/sets

The mobile lab for field use

p. 88

... utmost precision for lab use

photoLab®

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Reagents/ accessories

p. 92 /101

Thermoreactors

The convenient and safe way to digestions

p. 90

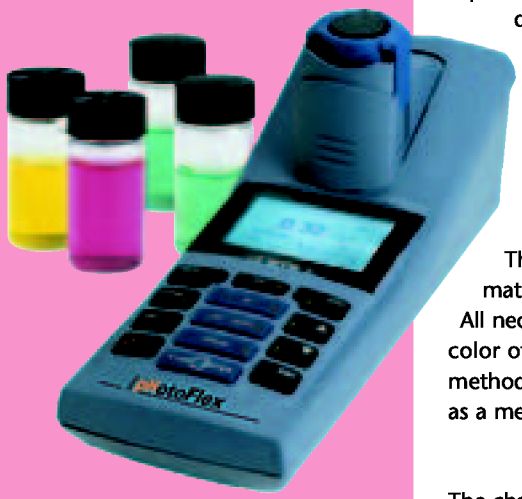
LabStation

The small lab solution: pHotoFlex plus LabStation

p. 88

A System of Instrument plus Reagent:

The Photometric Determination



A photometer is used in wastewater, drinking water and environmental analysis to determinate the concentration of dissolved substances. For this purpose, specific reagents are added to the dissolved substance to convert it into a measurable color. The color results from the absorption of a certain proportion (wavelengths) of the white light, and hence the measuring is done at the wavelength with the largest absorption. Whithin a linear range the degree of light absorption can be translated into concentration.

Thus, photometers and test sets make up a system whose components are matched optimally. Modern photometers provide method data for every test. All necessary settings, e.g. wavelength, conversion factors, blank value (= the own color of a solution), etc. are set automatically. When calibrating user defined methods or new reagents, the values for the test are measured, put in and stored as a method.

The characteristics of the test sets are different for each instrument, because the optics are different. Due to the difference in optics, it covers different measurement ranges for the same parameter measured on different photometers.

Portable and Accurate:
The pHotoFlex and photoLab® series

In order to choose the appropriate instrument, the following should be considered:

Mobile measuring
With pHotoFlex and pHotoFlex Turb

For fast and accurate measurements in the field consider these features:

- low power consumption
- robust
- mobile
- precise

These requirements are met by a special optical system working with a combination of LED and filters. The robustness of the portable pHotoFlex instruments is due to the low warming and to the longer lifespan of the LEDs utilized. With two cuvette sizes, these photometers allow for all common tests and offer a wide measuring range. The optional LabStation allows the user to conveniently download results collected in the field to a computer back at the lab.

Measuring in laboratory environment
With photoLab® S6/S12 and photoLab® Spektral

Highest demands are considered to be the basis for research, routine measurements and "calculation charges". Therefore, the instruments have to offer:

- AQS/IOK
- accurate measuring
- wide measuring ranges
- comfort features, e.g. test and cuvette recognition

A complex optical system and a short warm up time guarantee constant measuring conditions. The constant power supply allows the use of bar-codes. The optical system and rectangular cuvettes up to 50 mm allow wide measuring ranges reaching up to trace elements analysis. The largely constant temperature in the lab allows extensive presettings for the methods, thereby providing a higher user comfort.

What are the common features of both series?

- Proven quality, adapted to the respective use
- Highest accuracy corresponding to the used optical system
- A large selection of cuvettes and outstanding instrument features for a simple use of the cuvettes.

Application Photometers

	Portable Photometers		Laboratory Photometers		
Application range	**pHotoFlex**	**pHotoFlex Turb**	**photoLab® S6**	**photoLab® S12**	**photoLab® Spektral**
Application areas	Environmental monitoring, water treatment, beverage industry, wine industry, process control, multi-parameter applications for photometry, pH and turbidity.		Routine measurements in wastewater and drinking water, optional field use	Routine measurements in wastewater and drinking water, comprehensive laboratory tests, optional field use	Routine measurements in wastewater and drinking water, professional instrument for comprehensive laboratory tasks in the VIS sector
Wavelengths	6 wavelengths: 436, 517, 557, 594, 610, 690 nm	6 wavelengths: 436, 517, 557, 594, 610, 690, 860 nm	6 wavelengths: 340, 445, 525, 550, 605, 690 nm	12 wavelengths: 340, 410, 445, 500, 525, 550, 565, 605, 620, 665, 690, 820 nm	330 nm – 850 nm stepless
Optical system	LED with filters		Filter/Reference beam	Filter/Reference beam	Zeiss spectrometer module
Special functions	pH measurement	pH measurement, Turbidity (IR)	AQA/IQC	AQA/IQC, Kinetics	AQA/IQC, Kinetics, Absorption spectrum; incl. PC software for easy data transfer
	optional: LabStation for easy operation and laboratory evaluation with software and barcode reader support				
User-defined methods	100		No	50	100
Cuvettes	Round: 16 mm (height: 91 – 104 mm), 28 mm		Round 16 mm	Round and rectangular 10, 20, 50 mm	Round and rectangular 10, 20, 50 mm

photoLab® Series

The photoLab® Series:
Precision Laboratory Photometers for Every Demand

CE UL CUL 2 Year Warranty

- AQA/IQC, multistage
- Automatic cuvette identification
- Built-in barcode reader

All the 3 proven models of the photoLab® series offer the highest possible convenience plus stringent quality assurance: Open the top cover, insert the cuvette, take the reading!

- Automatic test identification with barcodes
- Automatic cuvette identification
- Automatic self-check
- Quality assurance functions for tests and for the instrument
  Password, intervals for instrument check and parameter, test with standards
- Use of rapid tests in reaction cuvettes

photoLab® S6

Standard instrument with 6 wavelengths, for all routine determinations in reaction cuvettes (16 mm), especially for wastewater and drinking water.

photoLab® S12

Advanced instrument with 12 wavelengths for test sets in round and in rectangular cuvettes, for wide measuring ranges and low concentrations. In addition, 50 user-defined methods and Kinetics measurements are possible.

photoLab® Spektral

High-grade variable spectral photometer with Zeiss optics for all routine and special tasks in the VIS range: Test sets for round and rectangular cuvettes, Kinetics measurements, recording of absorption and transmission spectrums, as well as 100 user-defined methods with freely selectable wavelength between 330 and 850 nm. Including software Multi/ACHAT II for a comfortable data management and convenient calibration of user-defined methods.

Technical Data

Model	photoLab® S6 and S6-A	photoLab® S12 and S12-A	photoLab® Spektral
Type	Filter Photometer	Filter Photometer	Spectrophotometer with photodiode array technology
Photodiode array for	6 wavelengths	12 wavelengths	–
Wavelengths, nm	340, 445, 525, 550, 605, 690	340, 410, 445, 500, 525, 550, 565, 605, 620, 665, 690, 820	Range 330 … 850, freely adjustable
User-defined methods	–	50	100
Auto-zero adjustment	Yes	Yes	Yes
AutoSelect-function	Yes	Yes	Yes
Cuvette recognition	Yes	Yes	Yes
Cuvette type	Round	Round, 10 mm, 20 mm and 50 mm	Round, 10 mm, 20 mm and 50 mm
Data storage and time	500 data sets with date and time	1000 data sets with date and time	1000 data sets with date and time
Essential functions	Concentration, absorption and transmission measurement, AQA/IQC, RS 232 interface	Concentration, absorption and transmission measurement, AQA/IQC, Kinetics, RS 232 interface	Concentration, absorption and transmission measurement, AQA/IQC, Kinetics, Absorption spectrum (Abs. +%T), RS 232 interface
Operation with rechargeable batteries (optional)	1 working day, total discharge protection, maintenance charging during mains operation	1 working day, total discharge protection, maintenance charging during mains operation	–
Test marks	CE, UL, CUL	CE, UL, CUL	CE, UL, CUL
Warranty	2 years	2 years	2 years

Ordering Information

Model		Order No.
photoLab® S6	Mains operated version, 230 V European standard plug	250 013
photoLab® S6-A	Version with rechargeable batteries, 230 V European standard plug	250 022
photoLab® S12	Mains operated version, 230 V European standard plug	250 024
photoLab® S12-A	Version with rechargeable batteries, 230 V European standard plug	250 026
photoLab® Spektral	230 V/115 V plug-in transformer with 4 plug adaptors	250 028
	Note: versions for other mains supplies/countries on request	

pHotoFlex Series

pHotoFlex:
The Portable Photometers

NEW

- **Complete Field Case**
  - **Photometry**
  - **pH**
  - **Turbidity**
- **Undetachable adapter**
- **Simple push button operation**

Field case with tray

The new portable photometers offer decisive advantages for field use: They are handy, have a low power consumption and a lot of extra features!

- Smart adapter solution for the use of different cuvettes
- Backlit display with automatic switch-off
- User guidance via display for easy operation without handbook reading
- Large selection of test sets for all requirements
- Method and software update via internet
- Integrated pH measurement with automatic temperature compensation
- Turbidity measurement with infrared light source according to DIN 27027/ISO 7027
- 100 program storage places for user-defined routine measurings
- Battery operation with 4 AA batteries for approx. 3000 measurements
- Optional LabStation with convenient data management for laboratory use
- Optional rechargeable battery set (alternative to LabStation)

The smart adapter solution

An ingenious flap mechanism has been developed to integrate the cuvette adapter undetachably in the instrument. Just slide the magnetic lid up and insert the 28 mm round cuvette. Or, simply flip up the adapter and use a 28 mm round cuvette. The cuvette can have a height of 91 to 104 mm and allows the use of different test sets.

pHotoFlex – portable photometer with pH

The portable photometer pHotoFlex demonstrates its capability with complex tasks in environmental and process monitoring at changing locations.

pHotoFlex features a highly robust optical system, thus being optimally suited for mobile applications under changing conditions. The LEDs plus filters for 6 wavelengths have a remarkably low power consumption and deliver accurate measuring results. The intuitive menu guidance allows a smooth operation even without studying instruction booklets. Dilution functions and timer ease work in special cases.

NEW

- **100 methods available**
- **Integrated pH measurement**
- **Color measurements**

with pH sensor SenTix® 41

pH function

The integrated pH function allows measurings of pH 0 ... 16 with automatic buffer recognition (TEC/NIST). Temperature compensation is automatic within the permitted range of 23 ... 212 °F (– 5 ... 100 °C). WTW's MultiCal®-routine allows the automatic calibration with up to 3 calibration points. WTW offers a large selection of pH sensors as an optional accessory: For field use, the maintenance-free SenTix® 41 is recommended, whereas for precision measurements in the laboratory, the SenTix® 81 glass electrode should be used. The electrodes are described in detail in the pH measuring chapter (from p. 19 onward).

pHotoFlex Turb – Total Capability

additionally:

- **Turbidity measurement according to DIN 27027/ ISO 7027**
- **0-1100 NTU/FNU**
- **Calibration kit (0.02-10-1000 NTU)**

The pHotoFlex Turb is analogous to the pHotoFlex, but has additionally an infrared (IR) light source for nephelometric turbidity measurement (90°), according to the requrirements of DIN 27027/ISO 7027. The calibration with the supplied AMCO® standards can be documented and output via RS232 like the measured data.

With the optional LabStation and the LSdata software, all data can be displayed and processed on the computer monitor conveniently and according to GLP (*see p. 88*).

pHotoFlex series in a convenient field case!

NEW

- The “in-field laboratory”
- Integrated tray
- Convenient

A small lab for in-field use. The integrated tray with placings for the instrument, cuvettes, measuring beaker and a stand for the pH electrode is particularly. practical. Complete sets with:

- pH electrode SenTix® 41 for all pHotoFlex models
- 1 variable pipette with 5 ml volume for all pHotoFlex models
- Calibration standards for pHotoFlex Turb and Turb 430 IR/T
- Many useful accessories: empty cuvettes, buffer solutions with pH 4.01 and 7.00, PC cable AK Labor 540 B, stand for the pH electrode, cleaning tissues, screwdriver for battery change
- Space for other accessories

LabStation plus LSdata –

The smart way of data management!

NEW

The LabStation upgrades the portable pHotoFlex and Turb 430 models to make it a small laboratory solution. With the new software package LSdata the measured data can be processed on a PC conveniently and according to GLP standards. The software is included in the delivery of the LabStation.

- Data export from the instrument to the PC according to GLP and with password protection
- Subsequent processing in Excel format, e.g. for clear documentation of individual sampling points
- Generation, administration and matching between instrument and PC of user-defined methods via dialogue window
- Calculation of calibration curve for user-defined methods

The LabStation also serves as charging station for the rechargeable battery set included in the delivery package. Alternatively a rechargeable battery set for pHotoFlex and Turb 430 models is available separately.

Accessories

Making your work easier

The rechargeable battery set RB Flex/430

Upgrades pHotoFlex/Turb 430 to rechargeable battery set: The set consists of a rechargeable battery pack with universal power supply. For the connection to a PC via RS 232, the AK540/B cable (Ordering No. 902 842) is required.

LabStation LS Flex/430

The LabStation pHotoFlex LS upgrades the models pHotoFlex and pHotoFlex Turb as well as the turbidity meters Turb 430 IR/T (*p. 108*) to a small laboratory instrument.

Because of the constant environmental conditions and permanent power supply, the test sets can be run more conveniently via barcode and without new zeroing. Barcodes are offered in the analysis descriptions and on the WTW website (www.WTW.com).

LSdata is an outstanding solution for the management of stored measurement data and for user defined methods too! The delivery includes LSdata, the rechargeable battery set RB Flex/430 and the connection cable AK Labor. The LabStation serves as a charging station for the rechargeable battery set as well.

Technical Data

Model		pHotoFlex	pHotoFlex Turb
Light source		LED	LED
Wavelengths nm		436, 517, 557, 594, 610, 690	436, 517, 557, 594, 610, 690 + 860
User-defined methods		100	100
Timer		3	3
Data storage		1000 data sets	1000 data sets
pH		0-16	0-16
Turbidity		—	0-1100 NTU/FNU
Accuracy	Photometry	<2 nm wavelength accuracy, 0.005 abs. reproducibility	< 2nm wavelength accuracy, 0.005 abs. reproducibility
	pH	±0.01 pH	±0.01 pH
	Turbidity (NTU/ FNU)	—	0.01 NTU/FNU or ±2% of the measured value
Auto-zero adjustment/calibration:	Photometry	With start of new method, with LabStation once a day	With start of new method, with LabStation once a day
	pH / Turbidity	3 point	3 point
Interface		RS 232, USB via adapter (optional)	RS 232, USB via adapter (optional)
Measuring parameters		Photometry, pH	Photometry, pH, Turbidity
Battery		Type AA batteries 4x1.5 V, for approx. 3000 measurements	Type AA batteries 4x1.5 V, for approx. 3000 measurements
Reachargeable battery		Optional: rechargeable battery or LabStation	Optional: rechargeable battery or LabStation
Test marks		cETLus	cETLus
Warranty		2 years	2 years

Ordering Information

	pHotoFlex	Order No.
pHotoFlex	Portable photometer with pH	251 100
pHotoFlex Turb	Portable photometer with pH and turbidity	251 110
pHotoFlex/SET	Portable universal LED filter photometer in a field case with tray to hold instrument and accessories	251 200
pHotoFlex Turb/SET	Portable universal LED filter photometer with integrated turbidity measurement and pH functions in a field case with tray to hold instrument, calibration standard kit and accessories	251 210
FC pHotoFlex/Turb 430	Field case with tray to hold instrument, for all pHotoFlex and Turb 430 models	251 304
LS Flex/430	LabStation for all pHotoFlex and Turb 430 models with LSdata software, rechargeable battery and universal mains adapter	251 301
RB Flex/430	Rechargeable battery for all pHotoFlex models and Turb 430 IR/T with universal plug	251 300

Photometers

Thermoreactors

CR 2200

CR 3200

CR 4200

CE cETLus 2 Year Warranty

- Programs for routine tests
- NEW Rapid digestion for COD
- Quality assurance with separate sensor

Thermoreactors for COD and all other thermal Digestion Processes

Thermoreactors are required for the determination of COD, total nitrogen or total phosphorus. They ensure a complete digestion of the sample, as they maintain the necessary high reaction temperature throughout the whole of the defined period.

In each of the thermoreactors from WTW the most important temperatures and digestion times are stored in 7, easily selectable digestion programs. In addition to these 7 fixed standard programs, CR 3200 and CR 4200 thermoreactors allow you to store 8 of your own user-defined programs. Suitable for 16 mm cuvettes.

New programs for COD

For the COD digestion, the user can now select among 3 programs: 289.4 °F (148°C), 302 °F (150°C, according to US EPA) for 120 minutes and, at the request of many customers, a **rapid digestion** for 20 minutes at 298.4 °F (148 °C). This timespan has proven sufficient for many purposes in practice.

Safety Precautions

All WTW thermoreactors optimize the heat transmission between the heating block and cuvettes as well as their superior safety. Apart from the built-in safety hood, which prevents chemicals from being splashed about should a cuvette break and the contact protection for the heating block surface, all reactors have timer functions. All reactors display when the reaction temperature is reached.

The right Instrument for the right Test!

CR 2200
is ideal for anyone who needs to perform routine water analysis tests with small sample amounts, as 7 programs are available for digestion of 12 sample cuvettes at 212, 248 and 298.4 °F (100, 120, 148 and 150 °C).

CR 3200
In addition, you can program the CR 3200 to carry out 8 of your individual digestions at freely selectable temperatures up to 338 °F (170 °C).

CR 4200
is the right choice for anyone who needs to perform multiple tests simultaneously, such as COD (298.4 °F/148 °C) and total-N (248 °F/120 °C), as the two thermoblocks for 12 cuvettes each can be controlled separately. It also has memory for 8 of your own user-defined programs with free temperature selection up to 338 °F (170 °C).

Quality Assurance:

Quality assurance is constantly increasing in importance, even in the operational analysis sector. The CR 3200 and CR 4200 thermoreactors are both equipped with the external temperature sensor TFK CR (Order No. 250 100) as a testing aid. This temperature sensor can be plugged into the interface in place of a cuvette and the set and actual temperatures can be outputted either to a printer or a PC. This means that the function can not only be monitored, but also documented.

Application Areas and Technical Data

	CR 2200	CR 3200	CR 4200
Application Areas	Routine measurements, wastewater	Routine and specialized tasks in wastewater and in laboratories	Routine and specialized tasks in wastewater and in laboratoriesr
Number of samples, max.:	1 x12	2 x 12 same program	2 x 12, different programs
7 pre-stored programs:	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min	212 °F (100 °C) 60 min, 248 °F (120 °C) with 30 min, 60 min, 120 min, 298.4 °F (148 °C) 120 min, 20 min 302 °F (150 °C) 120 min
Own programs	–	8 freely selectable 77-338 °F (25-170 °C)	8 freely selectable 77-338 °F (25-170 °C)
Control accuracy	±1 °C ±1 digit		
Safety class	I to DIN VDE 0700 part 1/11.90		
Instrument safety	EN 61010, UL 3101, CAN/CSA C22.2-1010; EN 61010-2-010, IEC-CAN/CSA C22.2-1010.2.010		
Dimensions	W: 10.08 in (256 mm); H: 7.28 in (185 mm), open: 11.42 in (290 mm); D: 12.4 in (315 mm)		

Ordering Information

Model		Order No.
CR 2200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 12 reaction cuvettes. (Regional power supply available on demand)	1P21-1
CR 3200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 2x12 reaction cuvettes. (Regional power supply available on demand)	1P22-1
CR 4200	Reactor (230 VAC with Europlug) for COD and other thermal digestions. For up to 2x12 reaction cuvettes in two separately controllable heating blocks. (Regional power supply available on demand)	1P23-1

For information visit **www.WTW.com** for a customer care center near you or inside US: call **WTW 800 645 5999**.

Reagents from A – Z

Reagents –

The right Test for every Application

- Convenient
- Precise
- Assured quality by AQA/IQC

A wide choice of tests is available for routine analysis in different applications. Depending on the optical system and the wavelength employed, photometer and test set make up a matched system with different specific advantages.

For use with portable photometers, test sets should first of all be straightforward. The low consumption LED optics allow the use of easy-to-use and cost-effective test sets, e.g. powder tests. In the laboratory, instruments with bar code and utmost optical sensitivity suggest the use of high-precision tests with bar code reader, certificate and quality assurance support.

WTW continues to expand our reagent offering. Not only are new tests developed, but the usability of tests with different instruments is continuously expanded. Due to the different photometer optics, one and the same test may yield different measuring ranges in different instruments. LED photometers usually have smaller measuring ranges for the same test.

Taking measurements correctly

Every concentration determination is accurate only within the linear absorption range. At the limits of the measuring range you have to expect deviations within the given tolerance. Therefore it may be well worth to repeat the measurement using a test set with a better suited measuring range.

Test Types Overview

Type	Cuvette test	Reagents test	Powder test
Certificate	With certificate (●) for optimum precision Without certificate (TC) for very good precision	With certificate (■) for optimum precision	Without certificate (TP), precise
Test identification	Bar code and/or method selection	Bar code and/or method selection	Method selection, bar code optional
Advantages:	Reaction cuvette with bar code or method selection, 16 mm: Sample adding, inserting, measuring and reading at minimum work, QA support for assured results	Large measuring range, recordation of low concentrations in rectangular cuvettes up to 50 mm, QA support for assured results	Compact, straight forward procedure few paraphernalia
Application area:	Laboratory, infrequent work or very large sample throughput	Laboratory, low concentrations, cost-effective routine work with large sample throughput	Mobile measurements, screening and monitoring tasks

Reagents

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	photoLab® CC	SW	S6	S12	Spektral	pHotoFlex
Acid Capacity up to pH 4.3												
●	01762/1	0.20-8.00 mmol/l 10 - 400 $CaCO_3$	round 0.2, 1.0, 5.0	5	252 059	90	–	–	●	●	●	●
●	01762/2*	0.20-8.00 mmol/l 10 - 400 $CaCO_3$	round 0.2, 1.0, 5.0	16		450	–	–	●	●	●	●
Ag Silver												
■	14831	0.25 - 3.00 mg/l Ag (total-Ag: 100 °C or 120 °C, 1 h) Digestion reagents are contained in the test set	10, 20	10	250 448	100	–	–	–	●	●	–
Al Aluminium												
●	00594*	0.02 - 0.50 mg/l Al	round	6.0 + 0.250		25	–	–	●	●	●	–
■	14825	0.020 - 1.20 mg/l Al	10, 20, 50, 28	5	250 425	300	✔	✔	–	●	●	●
TP	Al-1 TP	0.00 - 0.25 mg/l Al	28	20	251 400	100	–	–	–	–	–	●
Ammonium:												
	see NH_4											
Antimony:												
	Please ask for application leaflets											
AOX												
●	00675	0.05-2.50 mg/l AOX	round	100	252 023	25	–	–	●	●	●	–
Arsenic												
■	01747	0.001 - 0.100 mg/l As	10, 20,16 ,28	350	252 063	30	–	–	–	●	●	●
also required:	AS absorption tube				252 066	1						
Ascorbic acid:												
	Please ask for application leaflets											
Au Gold												
●	14821	0.5 - 12.0 mg/l Au	10, 16	2	250 436	80	✔	✔	–	●	●	●
B Boron												
■	14839	0.050 - 0.800 mg/l B	10, 20	5	250 427	60	–	–	–	●	●	–
●	00826	0.05 - 2.00 mg/l B	round	4	252 041	25	–	✔	–	●	●	–
Br_2 Bromine												
■	00605	0.020 - 10 mg/l Br_2	10, 20, 50	10	252 014	200	–	–	–	●	●	–
C_2H_5OH Alcohol (to be discontinued in course of 2006)												
●	14965	0.40 - 5.00 g/l Alcohol	round	0.2	252 031	25	–	–	●	●	●	–
C_6H_5OH Phenol												
■	00856	0.002 – 0.100 mg/l C_6H_5OH 0.025 – 5.000 mg/l C_6H_5OH	20 10, 20, 50	200 10	252 058	50 250	–	✔	–	●	●	–
●	14551	0.10 - 2.50 mg/l C_6H_5OH	round	10	250 412	25	–	✔	–	●	●	–
Ca Calcium												
■	14815	5 - 160 mg/l Ca	10, 20, 16, 28	0.1	250 428	100	–	✔	–	●	●	●
●	00858	10 - 250 mg/l Ca	round	1	252 047	25	–	–	●	●	●	–
Cd Cadmium												
●	14834	0.025 - 1.000 mg/l Cd	round	5	250 314	25	✔	–	●	●	●	●
■	01745	0.002- 0.500 mg/l Cd	10, 20, 50	10	252 051	55	–	–	–	●	●	–
Chromium plating bath:												
	See reagent-free tests											

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents from A – Z

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	CC	SW	photoLab® S6	photoLab® S12	photoLab® Spektral	photoLab® pHotoFlex
Cl Chloride												
●	14730	5 - 125 mg/l Cl	round	1	250 353	25	✔	✔	●	●	●	●
■	14897	2.5 - 250 mg/l Cl	10	1, 5	250 491	100	✔	✔	–	●	●	●
Cl_2 Chlor												
●	00595	0.03 - 6.00 Cl_2	round	5	250 419	200	–	–	●	●	●	●
●	00597	0.03 - 6.00 Cl_2	round	5	250 420	200	–	–	●	●	●	●
■	00598/1	0.010 - 6.00 Cl_2	10, 20, 50	10	252 010	1200	–	–	–	●	●	–
■	00598/2	0.010 - 6.00 Cl_2	10, 20, 50	10	252 011	200	–	–	–	●	●	–
■	00599	0.010 - 6.00 Cl_2	10, 20, 50	10	252 012	200	–	–	–	●	●	–
■	00602/1	0.010 - 6.00 Cl_2	10, 20, 50	10	252 013	200	–	–	–	●	●	–
■	00602/2	0.010 - 6.00 Cl_2	10, 20, 50	10	252 055	1200	–	–	–	●	●	–
■	14828	replaced by 00598, 00599, 00602										
■	14732	replaced by ClO_2 00608 and Ozone 00607										
TP	Cl-1 TP	0 - 2.00 mg/l Cl_2, free	round, 28	10	251 401	100	–	–	–	–	–	●
TP	Cl-2 TP	0.00 - 5.00 mg/l Cl_2, free	round, 28	25	251 402	100	–	–	–	–	–	●
TP	Cl-3 TP	0.00 - 2.00 mg/l Cl_2, total	28	25	251 414	100	–	–	–	–	–	●
ClO_2 Chlorine dioxide												
■	00608	0.020 - 10.00 mg/l ClO_2	10, 20, 50, 28	10	252 017	150	–	–	–	●	●	●
■	14732	replaced by ClO_2 00608 and Ozone 00607										
ClO_2 Chlorine dioxide/Chlorine/Ozone												
■	14732	replaced by ClO_2 00608 and Ozone 00607										
CN Cyanid Cyanid (free and easily liberatable cyanide)												
●	14561	0.010 - 0.500 mg/l CN	round	5	250 344	25	–	–	●	●	●	●
■	09701	0.002 - 0.500 mg/l CN	10, 20, 50	5, 10	250 492	100	–	–	–	●	●	–
Copper plating bath:												
	See reagent-free test											
Cr Chromate (chromium VI and total chromium)												
●	14552	0.05 - 2.00 mg/l Cr	round	10	250 341	25	–	✔	●	●	●	●
■	14758	0.01 - 3.00 mg/l Cr	10, 20, 50	5	250 433	250	–	✔	–	●	●	–
CrO_3 Chromium plating bath:												
	See reagent-free tests											
Cu Copper												
●	14553	0.05 - 8.00 mg/l Cu	round	5	250 408	25	–	✔	●	●	●	●
■	14767	0.02 - 6.00 mg/l Cu	10, 20, 50, 16, 28	10	250 441	250	–	✔	–	●	●	●
TP	Cu-1 TP	0.00 - 5.00 mg/l Cu	28	10	251 403	100	–	–	–	–	–	●
Cu plating bath:												
	See reagent-free tests											
Detergents:												
	See Surfactants: anionic, cationic, nonionic											
F Fluoride												
●	14557	0.10 - 1.5 mg/l F	round	5	250 365	25	–	✔	–	●	●	●
■	14598	0.10 - 20.0 mg/l F	10	5 resp. 0.5	252 048	100	–	–	–	●	●	–

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	photoLab® CC	SW	S6	S12	Spektral	pHotoFlex
Fe Iron												
●	14549	0.05 - 4.00 mg/l Fe	round	5	250 349	25	✔	✔	●	●	●	●
●	14896	1.0 - 50.0 mg/l Fe	round	1	250 361	25	–	–	●	●	●	–
■	14761/1	0.005 - 5.00 mg/l Fe	10, 20, 50, 16, 28	5	250 435	1000	✔	✔	–	●	●	●
■	14761/2	0.005 - 5.00 mg/l Fe	10, 20, 50, 16, 28	5	250 439	250	✔	✔	–	●	●	●
■	00796	0.010 - 5.00 mg/l Fe	10, 20, 50	8	252 042	150	✔	✔	–	●	●	–
TP	Fe-1 TP	0.00 - 1.80 mg/l Fe	28	10	251 404	100	–	–	–	–	–	●
TP	Fe-2 TP	0.00 - 3.00 mg/l Fe	28	10	251 405	100	–	–	–	–	–	●
Formaldehyde:												
	See HCHO											
Halogens (total):												
	See Cl_2, Br_2, J_2, ClO_2, O_3											
Hazen:												
	See reagent-free tests: Coloration											
H_2O_2 Hydrogen peroxide												
●	14731	2.0 - 20.0 mg/l H_2O_2	round	10	250 402	25	–	✔	–	●	●	–
■	18789*	0.10 - 6.00 mg/l H_2O_2	10, 20	8.0		approx. 100	–	✔	–	●	●	–
HCHO Formaldehyde												
●	14500	0.10 - 8.00 mg/l HCHO	round	2	250 406	25	–	–	●	●	●	–
■	14678	0.02 - 8.00 mg/l HCHO	10, 20, 50	3	250 331	100	–	–	–	●	●	–
Heavy metals:												
	See lead, cadmium, chromium											
I_2 Iodine												
■	00606	0.050 - 10.00 mg/l I_2	10, 20, 50	10	252 015	200	–	–	–	●	●	–
Iodine number:												
	See reagent-free tests: Coloration											
K Potassium												
●	14562	5.0 - 50.0 mg/l K	round	2	250 407	25	–	✔	●	●	●	●
●	00615	30 - 300 mg/l K	round	0.5	252 020	25	–	✔	●	●	●	–
Mg Magnesium												
●	00815	5.0 - 75.0 mg/l Mg	round	1	252 043	25	–	✔	●	●	●	●
Mn Manganese												
■	01739	0.005 – 2.000 mg/l Mn	10, 20, 50	8	252 056	250	–	–	–	●	●	–
■	14770	0.01 - 10.0 mg/l Mn	10, 20, 50	5	250 442	500	✔	✔	–	●	●	●
●	00816	0.10 - 5.00 mg/l Mn	round	7	252 035	25	✔	–	●	●	●	●
TP	Mn-1 TP	0.0 - 20.0 mg/l Mn	round, 28	10	251 406	100	–	–	–	–	–	●
Mo Molybdenum												
●	00860	0.02 - 1.00 mg/l Mo	round	10	252 040	25	–	–	–	●	●	–
TP	Mo-1 TP	0.0 - 35.0 mg/l Mo	round, 28	10	251 407	100	–	–	–	–	–	●
Monochloramine												
■	01632	0.05 – 10.0 mg/l Cl_2	10, 20, 50		252 057	150	–	–	–	●	●	–

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents from A – Z

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	CC	SW	photoLab® S6	photoLab® S12	photoLab® Spektral	pHotoFlex
N_2H_4 Hydrazine												
■	09711	0.005 - 2.00 mg/l N_2H_4	10, 20, 50	5	250 493	100	–	–	–	●	●	–
Na Sodium												
●	00885	10 - 300 mg/l Na	round	0.5	252 044	25	–	–	●	●	●	●
NH_4 Ammonium												
●	14739	0.010 - 2.000 mg/l NH_4-N 0.01 - 2.60 mg/l NH_4^+	round	5	250 495	25	✔	–	●	●	●	–
●	A5/25	0.20 - 8.00 mg/l NH_4-N 0.26 - 10.3 mg/l NH_4^+	round	1	250 323	25	✔	✔	●	●	●	●
●	14544	0.5 - 16.0 mg/l NH_4-N 0.6 - 20.6 mg/l NH_4	round	0.5	250 329	25	✔	✔	●	●	●	●
●	14559	4.0 - 80.0 mg/l NH_4-N 5.2 - 103.0 mg/l NH_4	round	0.1	250 424	25	✔	✔	●	●	●	–
■	14752	0.010 - 3.00 mg/l NH_4-N 0.013 - 3.86 mg/l NH_4	10, 20, 50, 16, 28	5	250 426	500	✔	✔	–	●	●	●
■	00683	2.0 - 150 mg/l NH_4-N 2.6 - 193 mg/l NH_4	10	0.1, 0.2	252 027	100	✔	✔	–	●	●	–
TP	NH_4-1 TP	0.00 - 0.50 mg/l NH_4-N 0.00 - 0.64 mg/l NH_4	28	10	251 408	100	–	–	–	–	–	●
TC	NH_4-2 TC (LR)	0.00 - 2.50 mg/l NH_4-N 0.00 - 3.20 mg/l NH_4	round	2	251 997	50	–	–	–	–	–	●
TC	NH_4-3 TC (HR)	0 - 50 mg/l NH_4-N 0 - 64 mg/l NH_4	round	0.1	251 998	50	–	–	–	–	–	●
Ni Nickel												
●	14554	0.10 - 6.00 mg/l Ni	round	5	250 409	25	✔	–	●	●	●	–
■	14785	0.02 - 5.00 mg/l Ni	10, 20, 50	5	250 443	250	✔	–	–	●	●	–
Nickel plating bath:												
	See reagent-free tests											
Nitrogen (total):												
	See N_{Total}											
NO_2 Nitrite												
●	N4/25	0.020 - 0.600 mg/l NO_2-N 0.05 - 2.00 mg/l NO_2	round	4	250 343	25	–	✔	●	●	●	●
●	00609*	1.0 - 90.0 mg/l NO_2-N 3.28 - 295.2 mg/l NO_2	16	8.0		25	–	✔	●	●	●	–
■	14776/1	0.005 - 1.000 mg/l NO_2-N 0.016 - 3.29 mg/l NO_2	10, 20, 50	5	250 445	1000	–	✔	–	●	●	●
■	14776/2	0.005 - 1.000 mg/l NO_2-N 0.016 - 3.29 mg/l NO_2	10, 20, 50	5	250 440	335	–	✔	–	●	●	●
TP	NO_2-1 TP	0.00 - 0.33 mg/l NO_2-N 0.00 - 1.08 mg/l NO_2	round, 28	10	251 409	100	–	–	–	–	–	●
TC	NO_2-2 TC	0.03 - 0.60 mg/l NO_2-N (LR) 0.10 - 1.97 mg/l NO_2 (LR)	round, 16	2	251 994	24	–	–	–	–	–	●
		0.30 - 3.00 mg/l NO_2-N (HR) 0.99 - 9.85 mg/l NO_2	round, 16	0.5								

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	photoLab® CC	SW	S6	S12	Spektral	pHotoFlex
NO_3 Nitrat												
●	14556	0.10 - 3.00 mg/l NO_3-N 0.4 - 13.3 mg/l NO_3	round	2	250 411	25	✔	✔	–	●	●	●
●	N1/25	0.5 - 23.0 mg/l NO_3-N 2 - 100 mg/l NO_3	round	0.5	250 342	25	✔	–	●	●	●	–
●	14542	0.5 - 18.0 mg/l NO_3-N 2.2 - 79.7 mg/l NO_3	round	1.5	250 410	25	✔	–	●	●	●	●
●	14764	1.0 - 50.0 mg/l NO_3-N 4 - 221 mg/l NO_3	round	0.5	250 347	25	✔	–	●	●	●	–
●	00614	23 - 225 mg/l NO_3-N 102 - 996 mg/l NO_3	round	0.1	252 019	25	–	–	●	●	●	–
■	14942	0.2 - 17.0 mg/l NO_3-N 0.9 - 75.3 mg/l NO_3	10, 20, 50	1	250 422	50	✔	✔	–	●	●	●
■	14773	0.2 - 20.0 mg/l NO_3-N 0.9 - 88.5 mg/l NO_3	10, 20	1.5, 3	250 444	100	✔	–	–	●	●	–
■	09713	0.1 - 25.0 mg/l NO_3-N 0.45 - 110.7 mg/l NO_3	10, 20, 50	0.5	250 421	90	✔	–	–	●	●	–
TC	NO_3-1 TC	0 - 30.0 mg/l NO_3-N 0-133 mg/l NO_3	round, 16	2	251 993	50	–	–	–	–	–	●
N_{Total} Total Nitrogen												
●	14537	0.5 - 15.0 mg/l N_{Total} (120 °C, 1 h)	round	10	250 358	25	✔	–	●	●	●	●
●	14763	10 - 150 mg/l N_{Total} (120 °C, 1 h)	round	1	250 494	25	✔	–	●	●	●	–
●	00613	0.5 - 15.0 mg/l N_{Total} (120 °C, 1 h)	round	10	252 018	25	✔	–	●	●	●	–
TC	N_{tot}1 TC (LR)	0 - 25.0 mg/l N_{Total} (120°C, 30 min.)	16	2; 2	251 995	50	–	–	–	–	–	●
TC	N_{tot}2 TC (HR)	5 - 150 mg/l N_{Total} (120°C, 30 min.)	16	0.5; 2	251 996	50	–	–	–	–	–	●
O_2 BOD Biochemical oxygen demand												
●	00687	0.5 - 3000 mg/l BOD	round	–	252 028	50	–	✔	●	●	●	–
also required:	BOD nutrient salt 00688 (252 029) BOD SFR Oxygen reaction bottles 14663 (252 032)											
available:	BOD standard (252 030)											
O_2 COD Chemical oxygen demand												
●	14560	4.0 - 40.0 mg/l COD (148 °C, 2 h)	round	3	250 303	25	✔	–	●	●	●	–
●	C1/25	15 - 160 mg/l COD (148 °C, 2 h)	round	2	250 302	25	✔	–	●	●	●	●
●	14895	15 - 300 mg/l COD (148 °C, 2 h)	round	2	250 359	25	✔	–	●	●	●	–
●	14690	50 - 500 mg/l COD (148 °C, 2 h)	round	2	250 304	25	✔	–	●	●	●	–
●	C2/25	25 - 1500 mg/l COD (148 °C, 2 h)	round	2	250 308	25	✔	–	●	●	●	●
●	14691	300 - 3500 mg/l COD (148 °C, 2 h)	round	2	250 351	25	✔	–	●	●	●	–
●	14555	500 -10000 mg/l COD (148 °C, 2 h)	round	1	250 309	25	✔	–	●	●	●	–
TC	COD1 TC (LR)	0 - 150 mg/l COD (148 °C, 2 h)	round	2	251 990	25	–	–	–	–	–	●
TC	COD2 TC (MR)	0 - 1500 mg/l COD (148 °C, 2 h)	round	2	251 991	25	–	–	–	–	–	●
TC	COD3 TC (HR)	0 - 15000 mg/l COD (148 °C, 2 h)	round	0.2	251 992	25	–	–	–	–	–	●

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents from A – Z

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	CC	SW	photoLab® S6	photoLab® S12	photoLab® Spektral	photoLab® pHotoFlex
O_2 CSB COD Chemical oxygen demand (HG free)												
●	09772	10 - 150 mg/l COD (148 °C, 2h)	round	2	250 301	25	✔	–	●	●	●	●
●	09773	100 - 1500 mg/l COD (148 °C, 2h)	round	2	250 306	25	✔	–	●	●	●	●
O_2 Oxygen												
●	14694	0.5 - 12.0 mg/l O_2	round		250 403	25	–	–	●	●	●	–
O_3 Ozone												
■	00607/1	0.010 - 4.00 mg/l O_3	10, 20, 50, 28	10	252 016	200	–	–	–	●	●	●
■	00607/2	0.010 - 4.00 mg/l O_3	10, 20, 50, 28	10	252 054	1200	–	–	–	●	●	●
■	14732	replaced by ClO_2 00608 and Ozone 00607										
Organic Acids (volatile)												
●	01763	50-3000 mg/l	round		252 060	100	–	–	●	●	●	–
Pb Lead												
●	14833	0.10 - 5.00 mg/l Pb	round	5	250 313	25	✔	–	●	●	●	–
■	09717	0.010 - 5.00 mg/l Pb	10, 50, 16, 28	8	252 034	50	✔	–	–	●	●	●
pH												
●	01744	pH 6.4 – 8.6	round	10	252 050	280	–	✔	●	●	●	–
Phenol:												
	See C_6H_5OH Phenol											
PO_4 Phosphate												
●	P4/25	0.05 - 1.50 mg/l PO_4-P 0.05 - 1.50 mg/l P_{Total} 0.20 - 4.50 mg/l PO_4	round	4	250 366	25	✔	✔	●	●	●	●
●	14543	0.05 - 5.00 mg/l PO_4-P 0.05 - 5.00 mg/l P_{Total} 0.2 - 15.3 mg/l PO_4	round	5	250 324	25	✔	✔	●	●	●	●
●	P5/25	0.3 - 15.0 mg/l PO_4-P 0.3 - 15.0 mg/l P_{Total} 1.0 - 45.0 mg/l PO_4	round	0.5	250 368	25	✔	✔	●	●	●	●
●	14546	0.5 - 25.0 mg/l PO_4-P 1.5 - 76.7 mg/l PO_4	round	5	250 413	25	✔	✔	●	●	●	●
●	14729	0.5 - 25.0 mg/l PO_4-P 0.5 - 25.0 mg/l P_{Total} 1.5 - 76.7 mg/l PO_4	round	1	250 334	25	✔	✔	●	●	●	●
●	00616	3.0 - 100.0 mg/l PO_4-P 10 - 307 mg/l PO_4	round	0.2	252 021	25	–	✔	●	●	●	●
■	14848	0.01 - 5.00 mg/l PO_4-P 0.03 - 15.3 mg/l PO_4	10, 20, 50, 16, 28	5	250 446	420	✔	✔	–	●	●	●
■	14842	0.5 - 30.0 mg/l PO_4-P 1.5 - 92.0 mg/l PO_4	10, 20	5	250 447	400	–	✔	–	●	●	–
■	00798	1.0 - 100 mg/l PO_4-P 3 - 307 mg/l PO_4	10	8	252 045	100	–	✔	–	●	●	●
TP	PO4-1 TP	0.00 - 0.80 mg/l PO_4-P 0.00 - 2.45 mg/l PO_4	round, 28	10	251 410	100	–	–	–	–	–	●
TC	PO4-2 TC	0.00 - 1.60 mg/l PO_4-P 0.00 - 4.91 mg/l PO_4	round, 16	5	251 989	50	–	–	–	–	–	●
TC	PO4-3 TC	0.00 - 1.10 mg/l PO_4-P 0.00 - 1.10 mg/l P_{Total} (digestion) 0.00 - 3.37 mg/l PO_4	round, 16	5	251 988	50	–	–	–	–	–	●

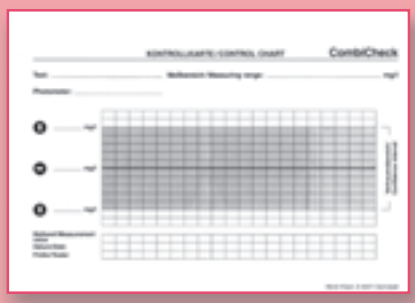
● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

Reagents

	Model	Measuring Range (Specification max.)	Cuvette (mm)	ml*	Order No.	No.	photoLab® CC	SW	S6	S12	Spektral	pHotoFlex
S Sulfide/Hydrogensulfide												
●	14779	0.02 - 1.50 mg/l S	10, 20, 50	5	250 450	220	–	–	–	●	●	–
Si Silicate/Silicic acid												
■	14794	0.005- 5.00 mg/l Si	10, 20, 50	5	250 438	300	–	✔	–	●	●	●
■	00857	0.5 - 500 mg/l Si	10	4/0.5	252 046	100	–	–	–	●	●	●
TP	Si-1 TP (LR)	0.00 - 1.60 mg/l SiO_2 0.00 - 0.75 mg/l SI	round, 28	10	251 411	100	–	–	–	–	–	●
TP	Si-2 TP (HR)	0.0 - 100.0 mg/l SiO_2 0.0 - 46.7 mg/l SI	round, 28	10	251 412	100	–	–	–	–	–	●
Sn Tin												
●	14622	0.10 - 2.50 mg/l Sn	round	5	250 401	25	–	✔	–	●	●	–
SO_3 Sulfite												
●	14394	1.0 - 20.0 mg/l SO_3	round	3	250 416	25	–	–	–	●	●	–
■	01746	1.0-60.0 mg/l SO_3	10	2	252 053	150	–	–	–	●	●	–
SO_4 Sulfate												
●	14548	5 - 250 mg/l SO_4	round	5	250 414	25	✔	✔	●	●	●	●
●	00617	50 - 500 mg/l SO_4	round	2	252 022	25	✔	✔	●	●	●	–
●	14564	100 - 1000 mg/l SO_4	round	1	250 415	25	✔	✔	●	●	●	–
■	14791	25 - 300 mg/l SO_4	10, 20	2.5	250 449	200	✔	–	–	●	●	–
TP	SO4-1 TP	0 - 70 mg/l SO_4	round, 28	10	251 413	100	–	–	–	–	–	●
Surfactants												
a-Ten (anionic) ●	14697	0.05 - 2.00 mg/l a-Ten	round	5	250 333	25	–	–	–	●	●	–
c-Ten (cationic) ●	01764	0.05 - 1.50 mg/l CTAB	round	5	252 062	25	–	–	–	●	●	–
n-Ten (nonionic) ●	01787	0.10 - 7.50 mg/l Triton X-100	round	4	252 061	25	–	–	–	●	●	–
TOC Total organic carbon												
●	14878	5.0 - 80.0 mg/l TOC	round	3	252 036	25	–	–	●	●	●	–
●	14879	50 - 800 mg/l TOC	round	3	252 037	25	–	–	●	●	●	–
also required:	TOC Screw Caps (252 038)											
available:	TOC Standard Solution 1000 mg/l (250 499)											
Total nitrogen:												
	See N_{Total}											
Total phosphorus:												
	See PO_4 Phosphate											
Water hardness, total hardness												
●	00961	0.7 - 30.1 °d 5 - 215 mg/l Ca	round	1	252 039	25	–	–	●	●	●	●
Water hardness, RH Residual hardness												
●	14683	0.075 - 0.750 °d 0.50 - 5.00 mg/l Ca	round	4	250 404	25	–	–	●	●	●	–
Zn Zinc												
●	00861	0.025 - 1.000 mg/l Zn	round	2	252 049	25	–	–	●	●	●	●
●	14566	0.20 - 5.00 mg/l Zn	round	0.5	250 417	25	✔	–	●	●	●	–
■	14832	0.05 - 2.50 mg/l Zn	10	5	250 451	90	–	–	–	●	●	–
Necessary reagent:	06146	Zinc reagent 6			250 452	180						

● = Reaction cuvettes tests; ■ = Reagent tests; TC* = Cuvette test; TP* = Powder pillows; CC = CombiCheck test; SW = Sea water; ml* = Sample volume; * = available Q3/2006

CombiCheck



Storage: 35.6 … 46.4 °F (+2 … +8 °C)

CombiCheck solutions are ready-to-use multi-parameter standards. Each package contains a standard solution and an addition solution. Both solutions can be used directly **without dilution** for quality assurance.

- The standard solution is used to check the accuracy of the results for the complete system: procedure - analytical method - reagents - photometer.
- The addition solution is used to check sample-dependent influences by measuring the recovery rate and to determine the most suitable sample preparation method.

The maximum number of determinations which can be made with a **CombiCheck** standard solution depends on the test set used. With the addition solution 280 determinations are always possible.
Read also all test kit instructions!

Model		Order No.
14676	CombiCheck 10	250 482

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Ammonium	4.00 mg/l NH_4-N	A5/25	90
		14558	90
Chloride	25.0 mg/l Cl	14730	90
COD	80 mg/l COD	C1/25	45
		14540	30
Nitrate	2.5 mg/l NO_3-N	14556	45
		14773	60
Phosphate	0.80 mg/l PO_4-P	P4/25	22
		14543	18
		14848	9
Sulfate	100 mg/l SO_4	14548	18
		14791	40
		00617	48

Model		Order No.
14675	CombiCheck 20	250 483

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Ammonium	12.0 mg/l NH_4-N	14544	180
Chloride	60 mg/l Cl	14730	90
COD	750 mg/l COD	C2/25	45
		14541	30
Nitrate	9.0 mg/l NO_3-N	N1/25	180
		14542	60
		14563	90
		14773	60
		14942	60
		09713	180
Phosphate	8.0 mg/l PO_4-P	P5/25	180
		14729	90
Sulfate	500 mg/l SO_4	14564	90

Model		Order No.
14677	CombiCheck 30	250 484

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Cadmium	0.500 mg/l Cd	14834	19
Copper	2.00 mg/l Cu	14553	19
		14767	19
Iron	1.00 mg/l Fe	14549	19
		14761	9
		00796	12
Manganese	1.00 mg/l Mn	14770	9
		00816	13

Model		Order No.
14692	CombiCheck 40	250 485

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Aluminium	0.75 mg/l Al	14825	19
Nickel	2.00 mg/l Ni	14554	19
		14785	19
Lead	2.00 mg/l Pb	14833	19
		09717	11
Zinc	2.00 mg/l Zn	14566	190

Model		Order No.
14695	CombiCheck 50	250 486

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Ammonium	1.00 mg/l NH_4-N	14739	19
		14752	19
Nitrogen	5.0 mg/l N_{Total}	14537	9
		00613	9
COD	20.0 mg/l COD	14560	32

Model		Order No.
14696	CombiCheck 60	250 487

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
COD	250 mg/l COD	14690	48
		14895	48
Chloride	125 mg/l Cl	14897	96

Model		Order No.
14689	CombiCheck 70	250 488

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
Ammonium	50.0 mg/l NH_4-N	14559	950
		00683	480
COD	5000 mg/l COD	14555	95
Nitrogen	50.0 mg/l N_{Total}	14763	95

Model		Order No.
14738	CombiCheck 80	250 489

Parameter	Concentration	Suitable for test set model	Max. no. of determinations
COD	1.500 mg/l COD	14691	48
Nitrate	25.0 mg/l NO_3-N	14764	190
Phosphate	15.0 mg/l PO_4-P	14729	95

Accessories

Standard Solutions

Parameter	Conc. in mg/l	Amount in ml	Model	Order No.
Aluminium	1000	500	19770	250 460
Ammonium	1000	500	19812	250 461
AOX	20	85 (8-16 Checks)	00680	252 026
Lead	1000	500	19776	250 462
Boron	1000	500	19500	250 463
BOD	210	10 bottles for 10 x 1l	00718	252 030
Cadmium	1000	500	19777	250 464
Calcium	1000	500	19778	250 465
Chloride	1000	500	19897	250 466
Chromium	1000	500	19779	250 467
Chromate	1000	500	19780	250 468
COD 160	100	30	KCSB 100	250 356
COD 1500	400	30	KCSB 400	250 357
Iron	1000	500	19781	250 469
Fluoride	1000	500	19814	250 470
Potassium	1000	500	70230	252 471
Silicic acid (Silicon)	1000	500	70236	252 472
Copper	1000	500	19786	250 473
Manganese	1000	500	19789	250 474
Nickel	1000	500	19792	250 475
Nitrate	1000	500	19811	250 476
Nitrite	1000	500	19899	250 477
Phosphate	1000	500	19898	250 478
Silver	1000	500	19797	250 479
Sulfate	1000	500	19813	250 480
TOC	1000	100	09017	250 499
Zinc	1000	500	19806	250 481

Standard solutions which limited stability, to be freshly prepared at regular intervals:

- Free chlorine
- Bound chlorine
- Formaldehyde
- Hydrazine
- Hydrogen peroxide
- Hydrogen sulfide
- Phenol
- Silicon
- Sulfide
- Sulfite
- Anionic surfactants

PhotoCheck

AQA/IQC: Comprehensive testing aid for optics and measurement linearity!

The stable colored solutions are used for checking the filter and the wavelength settings 445 nm/446 nm, 520 nm/525 nm as well as 690 nm. The correctness of the wavelength setting and the linearity of the extinction measurement are checked with 4 solutions per wavelength. The control is fast and comfortable, via a simple, menu-guided function. The traceability of this testing aid to international standards is guaranteed by checking the solutions in a reference photometer monitored with primary standards (NIST standards). These values are documented accordingly.

PipeCheck

Testing aid for the right pipetting volume!

The appropriate test solution is diluted with distilled water using the pipette to be checked and the extinction of the dilute solution is compared with that of a reference solution. Pipettes with a variation in volume of more than ± 2.5 % must be regarded as being faulty.

General Information

- The current **analytical procedure** is included in each package.
- **Certificates** for test sets ■ and ● can be found on the WTW homepage www.WTW.com.
- **Storage:** if no other information is provided then the test set can be stored at **59 to 77 °F (+15 to +25 °C)**.
- WTW recommends regularly checking reagents and photometers, e.g. with **PhotoCheck** and **CombiCheck.**
- Reaction cuvette tests are marked with ● and have only **one** measuring range. The cuvette information is "round", i.e. the outer diameter of the test cuvette is 16 mm. Reaction cuvette tests are pre-prepared rapid tests, with only **one** measuring range.
- Reagent tests are marked with ■. The measuring range information applies to the total useable measuring range for this method without sample dilution and normally involves changing a (rectangular) cuvette.
- The designation **TC** and **TP** stands for new test sets without charge certificate, that are suited for pHotoFlex. **TC** are reaction cuvette tests in 0.63 in (16 mm) cuvettes, **TP** are powder tests and are used in 0.63 in and 1.1 in (16 mm and 28 mm) cuvettes according to their measuring range.
- All reagent tests require, e.g. reaction vessels or RK 14/25 empty cuvettes and rectangular cuvettes
- Round cuvettes are not suitable for repeated use and are not to be used with reagent tests.
- In some tests a second citation form is given for the measuring ranges, e.g. nitrate as nitrate (NO_3) and as nitrate nitrogen (NO_3-N). Other possible units and citation forms which can be set are contained in the operating instruction for the instrument.
- Tests which require a **digestion** (e.g. COD) are marked with the digestion temperature and time (e.g. 298.4 °F/148 °C, 2 h). Thermoreactors from WTW are equipped with appropriate programs.

Virtually all offered tests are conform to standards according to DIN/ISO/EN/US EPA; please refer to the brochure "Product Details".

Reagent-free Tests

% transmittance
0 - 100 % T, 10, 20, 50 mm cuvette (self-absorption).

FAU turbidity
(EN ISO 7027) Determination of turbidity

Turbidity is caused in liquids by the presence of undissolved substances. For undissolved finely dispersed substances the turbidity can be measured by measuring the reduction in the intensity of a beam of light when passed through the liquid, or by measuring the intensity of the scattered radiation.

A formazin solution, which must be freshly prepared and is not commercially available, is used as a reference solution. According to EN ISO 7027, all instruments may be used which satisfy the following requirements:
Incoming radiation at 860 nm.
The results are given in FAU units (Formazin Attenuation Units) when the radiation passing through is measured.

Extinction

According to the Lambert-Beer law, the extinction $E = \varepsilon(\lambda) \cdot c \cdot d$ is proportional to the concentration of substances contained in the water. The proportionality constant $\varepsilon(\lambda)$ depends on the wavelength. These constants, and other data required for the determination of the solids in the water are stored in modern photometers as method data. The basic quantity measured is and remains the extinction.

Coloration
(EN ISO 7887: 1994)
If a layer of several meters of pure water is observed in transmitted light it appears to have a weakly blue coloration. This coloration can alter in the presence of contaminants to form a wide range of colorations. Natural waters are usually colored yellow-brown by contamination with iron or clay particles or humic matter.
(A green coloration can be produced by algae.) The "true" color of water is determined after filtration through a 0.45 µm filter

Normally most yellow-brown colored waters and the outflows of municipal sewage treatment plants can be measured at 436 nm. The outflows of industrial wastewater treatment plants show no sharp and distinctive extinction maxima. For the investigation of such water it is obligatory to measure at 436 nm (mercury line); the two other measuring wavelengths 525 nm and 620 nm can, depending on the filter used, vary slightly from these wavelengths. For discontinuous measurements the standard permits the use of filter photometers with a spectral bandwidth of < 20 nm for measurements at 436 nm, 525 nm and 620 nm. Thus, for example, instruments with 445 nm and 520 nm interference filters with a bandwidth of 10 nm are also suitable. For comparability with the standard, however, a spectrophotometer is required. The results are presented in m^{-1} together with the measuring wavelength, spectral bandwidth, water temperature and pH.

In some publications the result is given in DFZ (translucent coloration number); which is identical with the m^{-1} result.

(DIN ISO 6271: 19988)
Clear liquids, determination of the color number with the platinum-cobalt scale (Hazen color number, APHA color number). Spectrophotometers are mentioned as being suitable for measuring the stock solutions at 430 nm, 455 nm, 480 nm and 510 nm. According to the standard the measurement itself is carried out with a color comparator which allows a visual comparison.

Chrome-plating bath
Reagent-free measurement of the self-coloration of an electroplating bath. 5 ml of the sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 4 ml of the diluted sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 5 ml of the 1:500 dilution are placed in a screw-cap glass and 5 ml 40% sulfuric acid are added. The glass is sealed and the contents well mixed. The solution is filled into a rectangular cuvette for the measurement.

Nickel-plating bath
Reagent-free measurement of the self-coloration of an electroplating bath. 5 ml of the sample are pipetted into a round cuvette and 5 ml 40% sulfuric acid are added. The cuvette is sealed and the contents mixed. The solution is filled into a rectangular cuvette for the measurement.

Copper-plating bath
Reagent-free measurement of the self-coloration of an electroplating bath. 25 ml of the sample are pipetted into a 100 ml volumetric flask, filled up to the mark with distilled water and well mixed. 5 ml of the diluted sample are place in a screw-cap glass and 5 ml 40% sulfuric acid are added. The glass is sealed and the contents well mixed. The solution is filled into a rectangular cuvette for the measurement.