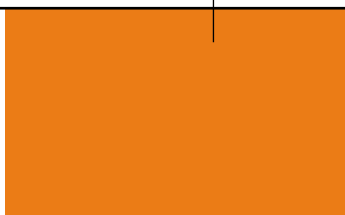


The Spectroquant® Analysis System

Safety in water analysis



MERCK

Right on target every time.

Quality is today a decisive factor in water and wastewater analysis – after all, the measurement results must be reliable.

Our extensive range of tools for quality assurance ensure that the values that you record in your measurements become secure, reproducible, and officially recognized analytical results.

Test kits

Photometers

Sample preparation

Guaranteed quality

Tested quality

Quality assurance from start to finish

Documentation

Service

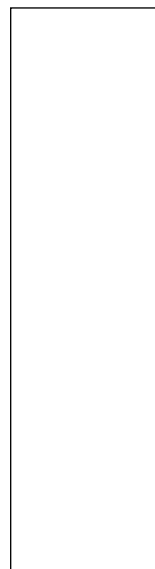
For us, quality starts with the production of our articles. Stringent checks ensure a consistently high quality. Guaranteed. We give you this guarantee in writing, too; lot certificate, quality certificate, test seal, and validation of the analytical methods are signs of our commitment to quality.

And to make it easier for you to check the quality whenever you wish to, we also offer a comprehensive range of equipment. Using the PhotoCheck, CombiCheck, and PipeCheck products and the thermosensors you can check the quality of your working materials and mode of operation from start to finish. Only when the safety of the overall system is given it is possible to guarantee the accuracy of your analytical results.

It's readily apparent that the overall system is secure and accurate only when each part of the system meshes well with the others and the quality demands are met by each component of the system.

The overall system is more than merely the sum of its parts.

Quality is the red thread




Simply. Comprehensive.

"A made-to-measure test kit for every analytical task."

Easy to handle, an excellent step-by-step description of the working procedure, and thus safety in their use – these are the features that characterize the Spectroquant® test kits. The calibration is another aspect that no longer need concern you: all test kits are already stored in the photometers.

Principle of the colour reaction:



Reagent
(Cuprizone)

+

Sample
(Cu ion)

=

blue colorant dye which
is measured
in the
photometer



Test kits



Tasks in the area of environmental analysis are comprehensively covered: no matter whether you're dealing with drinking water, surface water, process water, municipal or industrial wastewater, disposal drainage water, refuse, or soils – there are over 120 different Spectroquant® test kits and numerous applications available representing competent solutions all out of one hand. The range of parameters has been tuned to the special requirements of everyday practice and is expanded constantly.

| <p>Aggregate parameters</p> <p>such as COD are conventional parameters. The chemistry employed by the Spectroquant® test kits conforms with the relevant standards and bears the "USEPA Approved" seal issued by the American Environmental Protection Agency. Seven different measuring ranges for COD enable you to obtain accurate results without having to dilute samples.</p> | <p>Nutrients</p> <p>such as N and P are of major relevance in all water bodies. The steps for the pretreatment of samples necessary to ensure that the total contents are measured are already integrated in the Spectroquant® Cell Tests.</p> | <p>Hazardous substances</p> <p>such as cadmium, chromate, cyanide, and lead must be detectable even in the trace range – another aspect fulfilled by the Spectroquant® test kits.</p> | <p>Heavy metals</p> <p>are other substances that must be detected in electroplating and textile-industrial wastewater. An optimal sample pretreatment is absolutely essential in this connection. Spectroquant® Crack Sets ensure the complete digestion of samples here.</p> | <p>Anions</p> <p>such as nitrate, nitrite, chloride, fluoride, and sulfate are of essential relevance not only in the area of drinking-water supply. A practically oriented selection of Spectroquant® test kits leaves no question unanswered.</p> |
|--|---|--|--|--|



Simply. Legally secure.

“The validation of an analytical method is an absolute MUST in this day and age. Validation means legal security.”

All Spectroquant® analytical methods are validated, meaning that the quality is defined and certified. The validation data are determined for every Spectroquant® test kit and documented in the validation certificate.

Spectroquant® Cell Tests

One of the outstanding features of our Cell Tests is their user-friendly handling. Virtually all of the reagents needed for the analysis are already contained predosed in the cell. The barcode on each cell identifies it unmistakably. When the cell is inserted into the photometer, the barcode enables the correct method to be selected automatically, virtually preventing the occurrence of mix-ups at all.



Reaction cells

The cells are made of special high-quality glass with excellent optical characteristics.

Additional reagents

Other reagents that are required for the determination or for the sample pretreatment are contained in easy-to-handle metering bottles.

Cell label

Parameters and catalogue number, hazard warnings, the contents, and most importantly the barcode – a lot of information in a small space.

Package leaflet

All the information you need – for example the reaction principle, precise working instructions, area and scope of application, influence of foreign ions, data on the accuracy etc. are all presented concisely in the package leaflet.

Packaging

The packaging provides ideal protection for the cells during shipment as well as against temperature variations and moisture. The outer label provides important information on the contents and also gives safety advice. Hazard warnings in both symbol form as well as in writing, the batch number, and the shelf-life of the test kit (up to three years) all at a glance.

| Overview CT | Cat. No. | Parameter | Measuring range | Method |
|-------------|--------------|--------------------------|--|---|
| | 1.14965.0001 | Alcohol | 0.40 – 5.00 g/l C ₂ H ₅ OH | Enzymatical reaction |
| | 1.14739.0001 | Ammonium | 0.010 – 2.000 mg/l NH ₄ -N | Indophenol blue |
| | 1.14558.0001 | Ammonium | 0.20 – 8.00 mg/l NH ₄ -N | Indophenol blue |
| | 1.14544.0001 | Ammonium | 0.5 – 16.0 mg/l NH ₄ -N | Indophenol blue |
| | 1.14559.0001 | Ammonium | 4.0 – 80.0 mg/l NH ₄ -N | Indophenol blue |
| | 1.00675.0001 | AOX | 0.05 – 2.50 mg/l AOX | Oxidation to chloride |
| | 1.00826.0001 | Boron | 0.05 – 2.00 mg/l B | Azomethine H |
| | 1.00687.0001 | BOD | 0.5 – 3000 mg/l BOD | Modification of Winkler method |
| | 1.14834.0001 | Cadmium | 0.025 – 1.000 mg/l Ca | Cation-Derivat |
| | 1.00858.0001 | Calcium | 10 – 250 mg/l Ca | Phthaleinkomplexone |
| | 1.14730.0001 | Chloride | 5 – 125 mg/l Cl | Iron(III)-thiocyanate |
| | 1.00595.0001 | Chlorine, free | 0.05 – 7.50 mg/l Cl ₂ | DPD |
| | 1.00597.0001 | Chlorine, free and total | 0.05 – 7.50 mg/l Cl ₂ | DPD |
| | 1.14552.0001 | Chromate | 0.05 – 2.00 mg/l Cr | Diphenylcarbazide |
| | 1.14552.0001 | Chromium, total | 0.05 – 2.00 mg/l Cr | Oxidation, Diphenylcarbazide |
| | 1.14560.0001 | COD | 4.0 – 40.0 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14540.0001 | COD | 10 – 150 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14895.0001 | COD | 15 – 300 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14690.0001 | COD | 50 – 500 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14541.0001 | COD | 25 – 1500 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14691.0001 | COD | 300 – 3500 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14555.0001 | COD | 500 – 10 000 mg/l COD | Chromosulfuric acid oxidation |
| | 1.09772.0001 | COD (Hg-free) | 10 – 150 mg/l COD | Chromosulfuric acid oxidation |
| | 1.09773.0001 | COD (Hg-free) | 100 – 1500 mg/l COD | Chromosulfuric acid oxidation |
| | 1.14553.0001 | Copper | 0.05 – 8.00 mg/l Cu | Cuprizone |
| | 1.14561.0001 | Cyanide | 0.010 – 0.500 mg/l CN | Barbituric acid and pyridinecarboxylic acid |
| | 1.14557.0001 | Fluoride | 0.10 – 1.50 mg/l F | Alizarinkomplexone |
| | 1.14500.0001 | Formaldehyde | 0.10 – 8.00 mg/l HCHO | Chromotropic acid |
| | 1.14731.0001 | Hydrogen peroxide | 2.0 – 20.0 mg/l H ₂ O ₂ | Titanyl sulfate |
| | 1.14549.0001 | Iron | 0.05 – 4.00 mg/l Fe | Triazine |
| | 1.14896.0001 | Iron (II) and (III) | 1.0 – 50.0 mg/l Fe | 2.2'-Dipyridyl |
| | 1.14833.0001 | Lead | 0.10 – 5.00 mg/l Pb | PAR |
| | 1.00815.0001 | Magnesium | 5.0 – 75.0 mg/l Mg | Phthaleinkomplexone |
| | 1.00816.0001 | Manganese | 0.10 – 5.00 mg/l Mn | Formaladoxime |
| | 1.00860.0001 | Molybdenum | 0.02 – 1.00 mg/l Mo | Bromopyrogallol red |
| | 1.14554.0001 | Nickel | 0.10 – 6.00 mg/l Ni | Dimethylglyoxime |
| | 1.14542.0001 | Nitrate | 0.5 – 18.0 mg/l NO ₃ -N | Nitrospectral |
| | 1.14563.0001 | Nitrate | 0.5 – 25.0 mg/l NO ₃ -N | 2.6-Dimethylphenol |
| | 1.14764.0001 | Nitrate | 1.0 – 50.0 mg/l NO ₃ -N | 2.6-Dimethylphenol |
| | 1.00614.0001 | Nitrate | 23 – 225 mg/l NO ₃ -N | 2.6-Dimethylphenol |
| | 1.14556.0001 | Nitrate in seawater | 0.10 – 3.00 mg/l NO ₃ -N | Resorcine |
| | 1.14547.0001 | Nitrite | 0.010 – 0.700 mg/l NO ₂ -N | Griess Reaction |
| | 1.00613.0001 | Nitrogen, total | 0.5 – 15.0 mg/l N | Oxidation, 2.6-Dimethylphenol |
| | 1.14537.0001 | Nitrogen, total | 0.5 – 15.0 mg/l N | Oxidation, Nitrospectral |
| | 1.14763.0001 | Nitrogen, total | 10 – 150 mg/l N | Oxidation, 2.6-Dimethylphenol |
| | 1.14694.0001 | Oxygen | 0.5 – 12.0 mg/l O ₂ | Modification of Winkler method |
| | 1.14551.0001 | Phenole | 0.10 – 2.50 mg/l Phe | MBTH |
| | 1.14543.0001 | Phosphate | 0.05 – 5.00 mg/l PO ₄ -P | PMB |
| | 1.14543.0001 | Phosphorus, total | 0.05 – 5.00 mg/l P | Oxidation, PMB |
| | 1.14729.0001 | Phosphate | 0.5 – 25.0 mg/l PO ₄ -P | PMB |
| | 1.14729.0001 | Phosphorus, total | 0.5 – 25.0 mg/l P | Oxidation, PMB |
| | 1.00616.0001 | Phosphate | 3.0 – 100.0 mg/l PO ₄ -P | PMB |
| | 1.14546.0001 | Phosphate | 0.5 – 25.0 mg/l PO ₄ -P | VM |
| | 1.14562.0001 | Potassium | 5.0 – 50.0 mg/l K | Kalignost |
| | 1.00615.0001 | Potassium | 30 – 300 mg/l K | Kalignost |
| | 1.14683.0001 | Residual Hardness | 0.50 – 5.00 mg/l Ca | Phthaleinkomplexone |
| | 1.00885.0001 | Sodium | 10 – 300 mg/l Na | as chloride |
| | 1.14548.0001 | Sulfate | 5 – 250 mg/l SO ₄ | Bariumchloride |
| | 1.00617.0001 | Sulfate | 50 – 500 mg/l SO ₄ | Bariumchloride |
| | 1.14564.0001 | Sulfate | 100 – 1000 mg/l SO ₄ | Bariumchloride |
| | 1.14394.0001 | Sulfite | 1.0 – 20.0 mg/l SO ₃ | Ellman's reagens |
| | 1.14697.0001 | Surfactants, anionic | 0.05 – 2.00 mg/l MBAS | Methylene blue |
| | 1.14622.0001 | Tin | 0.10 – 2.50 mg/l Sn | Pyrocatechol violet |
| | 1.14878.0001 | TOC | 5.0 – 80.0 mg/l TOC | Oxidation, indicator |
| | 1.14879.0001 | TOC | 50 – 800 mg/l TOC | Oxidation, indicator |
| | 1.00961.0001 | Total hardness | 5 – 215 mg/l Ca | Phthaleinkomplexone |
| | 1.00861.0001 | Zinc | 0.025 – 1.000 mg/l Zn | PAR |
| | 1.14566.0001 | Zinc | 0.20 – 5.00 mg/l Zn | PAR |



Simply. Compliant.

“The valid standard is the measure.”

Many Spectroquant® analysis methods conform with official standards and are thus comparable. This gives you the sense of security you need.

Spectroquant® Reagent Tests

contain stable, ready-to-use reagent mixtures in a user-friendly form. Since you can select the cell format, the measuring range is highly variable. The linearity of the calibration function is tested for each individual cell format. The AutoSelector contained in each pack is fitted with a barcode that ensures that the correct method is selected in the photometer. The use of 50-mm cells in many cases enables the LLD to be shifted down to the ppb range.

Spectroquant® test kits can be used in all spectrophotometers and also in photometers from other suppliers.



Reagent Tests

Reagents

The reagents are supplied either in liquid or in solid form and are added to the sample using a dropper, pipette, or metering spoon. An extremely long shelf-life (up to three years) and the avoidance of the necessity for refrigeration storage are the major advantages.

| Overview RT | Cat. No. | Parameter | Measuring range | Method |
|-------------|--------------|--------------------------|---|---|
| | 1.14825.0001 | Aluminium | 0.020 – 1.20 mg/l Al | Chromazurole S |
| | 1.14752.0001 | Ammonium | 0.010 – 3.00 mg/l NH ₄ -N | Indophenol blue |
| | 1.00683.0001 | Ammonium | 2.0 – 150 mg/l NH ₄ -N | Indophenol blue |
| | 1.14839.0001 | Boron | 0.050 – 0.800 mg/l B | Rosocyanine |
| | 1.00605.0001 | Bromine | 0.020 – 7.50 mg/l Br ₂ | DPD |
| | 1.14815.0001 | Calcium | 5 – 160 mg/l Ca | Glyoxal-bis-hydroxyanil |
| | 1.00598.0001 | Chlorine, free | 0.010 – 7.50 mg/l Cl ₂ | DPD |
| | 1.00602.0001 | Chlorine, total | 0.010 – 7.50 mg/l Cl ₂ | DPD |
| | 1.00599.0001 | Chlorine, free and total | 0.010 – 7.50 mg/l Cl ₂ | DPD |
| | 1.14828.0001 | Chlorine, free and total | 0.010 – 7.50 mg/l Cl ₂ | DPD |
| | 1.00608.0001 | Chlorine dioxide | 0.020 – 7.50 mg/l ClO ₂ | DPD |
| | 1.14732.0001 | Chlorine dioxide | 0.020 – 5.00 mg/l ClO ₂ | DPD |
| | 1.14897.0001 | Chloride | 2.5 – 250 mg/l Cl | Iron(III)-thiocyanate |
| | 1.14758.0001 | Chromate | 0.010 – 3.00 mg/l Cr | Diphenylcarbazide |
| | 1.14767.0001 | Copper | 0.02 – 6.00 mg/l Cu | Cuprizone |
| | 1.09701.0001 | Cyanide | 0.002-0.500 mg/l CN | Barbituric acid and pyridinecarboxylic acid |
| | 1.14598.0001 | Fluoride | 0.10 – 20.0 mg/l F | Alizarinkomplexone |
| | 1.14678.0001 | Formaldehyde | 0.02 – 8.00 mg/l HCHO | Chromotropic acid |
| | 1.14821.0001 | Gold | 0.5 – 12.0 mg/l Au | Rhodamine B |
| | 1.09711.0001 | Hydrazine | 0.005 – 2.00 mg/l N ₂ H ₄ | Dimethylaminobenzaldehyde |
| | 1.00606.0001 | Iodine | 0.020 – 7.50 mg/l I ₂ | DPD |
| | 1.14761.0001 | Iron | 0.005 – 5.00 mg/l Fe | Triazine |
| | 1.00796.0001 | Iron (II) and (III) | 0.010 – 5.00 mg/l Fe | 1.10-Phenanthroline |
| | 1.09717.0001 | Lead | 0.010 – 5.00 mg/l Pb | PAR |
| | 1.14770.0001 | Manganese | 0.010 – 10.00 mg/l Mn | Formaloxime |
| | 1.14785.0001 | Nickel | 0.02 – 5.00 mg/l Ni | Dimethylglyoxime |
| | 1.14773.0001 | Nitrate | 0.2 – 20.0 mg/l NO ₃ -N | Nitrospectral |
| | 1.09713.0001 | Nitrate | 0.10 – 25.0 mg/l NO ₃ -N | 2.6-Dimethylphenol |
| | 1.14942.0001 | Nitrate in seawater | 0.2 – 17.0 mg/l NO ₃ -N | Resorcine |
| | 1.14776.0001 | Nitrite | 0.005 – 1.000 mg/l NO ₂ -N | Griess reaction |
| | 1.00607.0001 | Ozone | 0.010 – 7.50 mg/l O ₃ | DPD |
| | 1.14848.0001 | Phosphate | 0.010 – 5.00 mg/l PO ₄ -P | PMB |
| | 1.00798.0001 | Phosphate | 1.0 – 100.0 mg/l PO ₄ -P | PMB |
| | 1.14842.0001 | Phosphate | 0.5 – 30.0 mg/l PO ₄ -P | VM |
| | 1.14794.0001 | Silicate (Silicic acid) | 0.005 – 5.00 mg/l Si | Silicomolybdenum blue |
| | 1.00857.0001 | Silicate (Silicic acid) | 0.5 – 500 mg/l Si | Molybdatosilicate |
| | 1.14791.0001 | Silver | 0.25 – 3.00 mg/l Ag | Eosine, Phenanthroline |
| | 1.14831.0001 | Sulfate | 25 – 300 mg/l SO ₄ | Tannin |
| | 1.14779.0001 | Sulfide | 0.020 – 1.50 mg/l S | Dimethyl-p-phenylendiamine |
| | 1.14832.0001 | Zinc | 0.05 – 2.50 mg/l Zn | Cl-PAN |

Simply. Convenient.

“Only the best is good enough.”

Analytical Quality Assurance (AQA) is realized by innovative equipment technology in the photometers.

Optics

The heart of the photometers, the optical system, is robust and is not subject to any mechanical wear and tear, since it does not contain any moving parts. State-of-the-art electronics support the optics. In the Spectroquant® NOVA 30 and NOVA 60 photometers, there are six and, respectively, twelve narrow-band interference filters and photo-diodes in array technology that take care of the measurements. An optical module plus a photo-diode array – these are the essential features of the Spectroquant® NOVA 400 model.

Quality Assurance

Analytical Quality Assurance is an absolute must in the water-analysis field. We have already set the switch to meet this challenge of the future. The Spectroquant® photometers give you the support you need for comprehensive AQA, guaranteeing the GLP-conforming documentation of your measurement results in the process.

Barcode recognition

Each test kit is made unmistakable by means of a barcode. When the cell or the AutoSelector (in the case of analysis using reagent tests) is inserted, the barcode is scanned by the photometer. The device automatically identifies the method, retrieves the stored data, and in a matter of seconds shows the measurement value on the display in the desired form. Manual settings are a thing of the past.

Method update

All information on new test kits can be downloaded from the internet in the form of our method update software. Your photometer automatically saves the new data – job done!

Powerpacks for on-the-spot use

The two photometers Spectroquant® NOVA 30A and NOVA 60A can be optionally ordered with a rechargeable powerpack that enables up to about 500 measurements to be made each week.



Photometers

Automatic cell recognition

The Spectroquant® NOVA 60 and NOVA 400 photometers feature an automatic recognition of rectangular cells. The photometer identifies the optical path length of the inserted cell and immediately calculates the correct concentration. Errors due to the incorrect choice of cells are thus excluded.

Turbidity correction

Turbid measurement solutions are a typical cause of measurement errors. Turbidity is generally independent on the wavelength. Since the diode-array technology permits the simultaneous measurement at several different wavelengths, any turbidity present in the sample solution is recognized and automatically corrected.



Order Information

| Cat. No. | Designation |
|--------------|------------------------|
| 1.09748.0001 | Spectroquant® NOVA 30A |
| 1.09751.0001 | Spectroquant® NOVA 60 |
| 1.09752.0001 | Spectroquant® NOVA 60A |
| 1.09777.0001 | Spectroquant® NOVA 400 |

Simply. Manifold.

“Exactly the right photometer for you.”

Different requirements demand different solutions. The Spectroquant® photometers are designed from practical experience – there is a measurement device for every area of application. The concept common to all is a high measurement quality backed up by ease of use and start-to-finish Analytical Quality Assurance.

Spectroquant® NOVA 60 **The comfortable and flexible photometer for daily routine operations**

The Spectroquant® NOVA 60 is compact and can also be made mobile when the need arises. Besides having all the Cell Tests pre-programmed, the Spectroquant, reagent tests are also integrated. The device automatically recognizes the cell that has been inserted and uses the measured absorbance to calculate the concentration in a matter of seconds. More than 120 test kits with a wide variation of measuring ranges and practical forms of unit expression make the NOVA 60 a photometer for universal use. Three AQA modi are provided for your security purposes. You can even programme and save up to ten of your own photometric methods in this unit.



Spectroquant® NOVA 30A **The easy-to-handle starter photometer**

The Spectroquant® NOVA 30A is compact, robust, and even mobile when called for. All the important Cell Tests for water and wastewater analysis can be measured. The data for roughly 60 different test kits are already programmed in the database. The starter model NOVA 30A naturally also possesses the barcode-scanner system, making measurements so easy and so safe to conduct. AQA support and documentation are other features that go without saying for the NOVA 30A.



Photometers



Spectroquant® NOVA 400
The flexible photometer,
even for individual solutions

Barcodes and automatic cell identification are the factors that make measurement with the Spectroquant® NOVA 400 photometer so easy and comfortable. All data on every available test kit are already firmly integrated in the photometer's memory chip. But the NOVA 400 is capable of more than just that. In contrast to the other two devices in the NOVA range, this is a spectrophotometer that can perform measurements at any desired wavelength in the 350–850 nm range. This means that it can also be used for reference analysis (DIN, EN ISO, EPA). The photometer can permanently store up to 99 other methods. Absorbance spectra can be recorded and maximum absorbances determined in a matter of seconds. Easy-to-handle tools are also available for continuous-flow tests and for colorimetric and turbidimetric investigations.

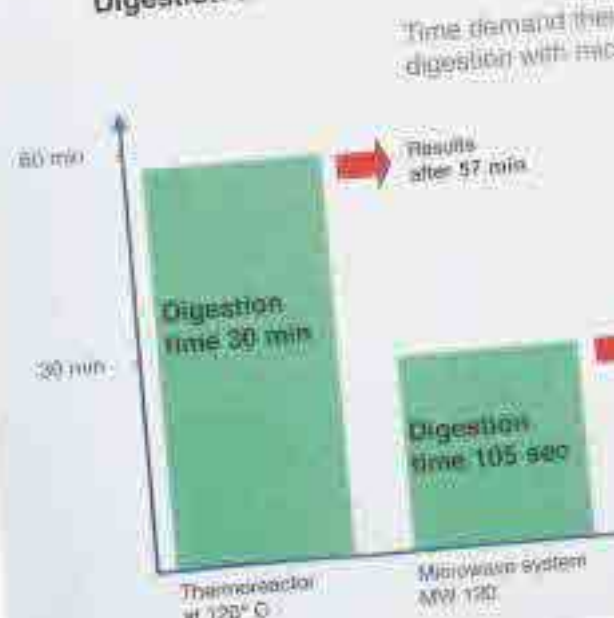
Simply. Effective.

“Complete sample digestion is essential for correct analysis results.”

The sample pretreatment is an integral part of the Spectroquant® analysis system. Some test kits already contain all the necessary reagents for preparing the samples for analysis. For a wide range of other analytical problems we offer our special Spectroquant® Crack Sets for sample pretreatment that are effective and yet easy to carry out at the same time.

left COD, right TOC –
2 times 6 all at one go

Digestion and Determination of Total



Thermoreactors

TR 320

Simple to handle on account of the 5 standard digestion methods programmed in the device, yet still capable of digesting 12 samples at one time – this is our TR 320 thermoreactor.

The TR 320 thermoreactor has all that is necessary for a simple and correct digestion procedure.

TR 420

Flexible in its use due to the free selection of temperature and time parameters besides 5 standard digestion programmes for the concurrent digestion of 24 samples in one run, and all this with a high degree of security due to the integrated AQA function – that's the TR 420 thermoreactor.

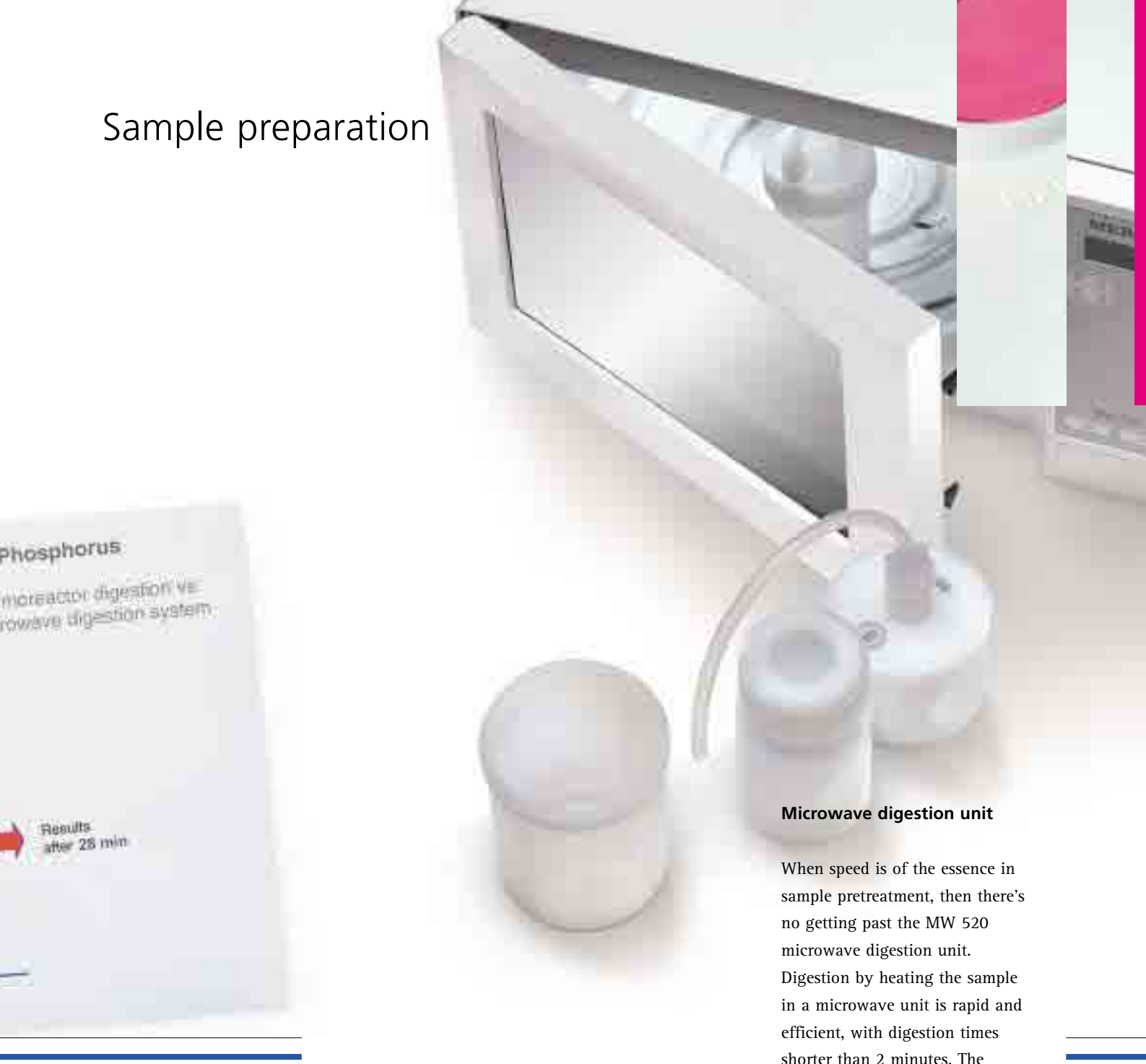
The TR 420 thermoreactor already includes all the digestion programmes required in the wastewater-analysis area, but can nevertheless be deployed individually up to temperatures of 170 °C and with digestion times of up to 3 hours.

TR 620

A professional two-in-one device combining all the advantages of the TR 420, but with 2 heating blocks that can be individually programmed for temperature/time – that's the TR 620 thermoreactor.

The TR 620 thermoreactor has 2 separately controllable heating blocks that enable the user to run different digestion programmes in parallel. It is thus possible, for example, to simultaneously process 12 COD and 12 TOC cell tests to have them ready for measurement within the space of 120 minutes.

Sample preparation



Microwave digestion unit

When speed is of the essence in sample pretreatment, then there's no getting past the MW 520 microwave digestion unit. Digestion by heating the sample in a microwave unit is rapid and efficient, with digestion times shorter than 2 minutes. The efficiency of the digestion process can be enhanced further still by increasing the quantity of the respective digestion reagent. In this way it is possible to guarantee correct analysis results, even in heavily contaminated wastewater with COD contents of 1000 – 2000 mg/l.

The standard digestion programmes

Standard programmes for routine digestion procedures help to avoid operating errors. The Spectroquant® Thermoreactor family features 5 standard programmes for the daily routine:

- 148 °C, 120 min for COD
- 120 °C, 120 min for TOC
- 120 °C, 60 min for total nitrogen, total content of Cr, Cu, Ni, Pb, Cd, Fe and Zn
- 120 °C, 30 min for AOX, total phosphorus, cyanide
- 100 °C, 60 min for Ag

Order Information

| Cat. No. | Designation |
|--------------|---------------------------------------|
| 1.71200.0001 | Spectroquant® Thermoreactor TR 320 |
| 1.71201.0001 | Spectroquant® Thermoreactor TR 420 |
| 1.71202.0001 | Spectroquant® Thermoreactor TR 620 |
| 1.14672.0001 | Microwave digestion unit MW 520 |
| 1.14613.0001 | Digestion basic set |

Simply. Correct.

“Safe handling guarantees correct measurement results.”

Reagents for sample pretreatment in the test kit

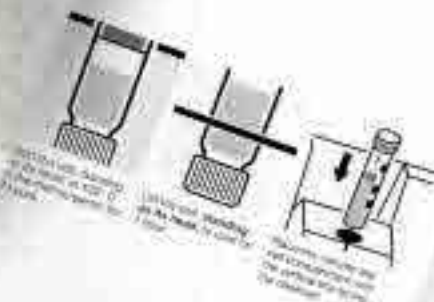
The determination of COD, TOC, AOX, total nitrogen, total phosphorus, total chromium, and silver is very simple with the reagent kits. All the necessary reagents – even those for the digestion process – are contained in the test kit. The illustrated operating instructions safely guide the user to accurate results.



Sample with high TOC content

Sample with low TOC content

Removal of inorganic bound carbon (TIC):



Sample preparation



Crack Sets

The determination of the total content is not always the objective of analysis. As measure to enhance the flexibility and to avoid having to buy all the chemicals in the test kit, the reagents for sample pretreatment are also available separately in single packs. In this way you can solve your analytical tasks individually.



| Crack Set 10 | Crack Set 10C | Crack Set 20 |
|--------------|---------------|--------------|
|--------------|---------------|--------------|

Crack Set 10

Digestion reagents for the determination of the total contents of cadmium, chromium, copper, iron, lead, nickel, phosphorus, and zinc. This set is suited for digestions in the thermoreactor or the microwave digestion unit.

Crack Set 10C

The "C" stands for "cells", i.e. this set contains the reagents necessary for digestion in the thermo-reactor predosed in cells. The area of application is identical to that for Crack Set 10.

Crack Set 20

Reagents for the digestion of total nitrogen for use in the thermoreactor or in the microwave digestion unit.

Order Information

| Cat. No. | Designation |
|--------------|--------------------------------|
| 1.14687.0001 | Spectroquant® Crack Set 10 |
| 1.14688.0001 | Spectroquant® Crack Set 10C |
| 1.14963.0001 | Spectroquant® Crack Set 20 |

Simply. Reliable.

"We guarantee a high and consistent quality of our products."

| | |
|---|------|
| ... documented in a report, has verified that the management system fulfils the requirements of the following standard: | |
| DIN EN ISO 9001 August 1994 edition | |
| certificate is valid until: | 2002 |
| State Registration No.: | 0053 |

| | |
|---|-------|
| ... documented in a report, has verified that the management system fulfils the requirements of the following standard: | |
| DIN EN ISO 14001 October 1996 edition | |
| certificate is valid until: | 2004 |
| State Registration No.: | 00535 |

Quality is something that goes without saying at Merck. Over 100 years of competence and leadership in the area of analysis would be inconceivable without the high quality demands we exact of ourselves. After all, we are a company that has been certified according to DIN EN ISO 9001 ever since 1992 and also to DIN EN ISO 14001 since 2001.

Many Spectroquant® tests have been approved by the American Environmental Protection Agency for the analysis of drinking water and wastewater and are entitled to bear the "USEPA Approved" seal.



The quality of the Spectroquant® photometers

The same principles also apply for the manufacture of the photometers. A record of final inspection certificate is delivered with every device, confirming not only the optical aspects (photometric accuracy, linearity, reproducibility, correctness of the wavelengths), but also the electrical safety.

The quality of the Spectroquant® test kits

Stringent controls on the raw materials, effective in-process controls, and documented end control are guarantees for the consistent quality of the test kits. Every batch we produce is given a lot certificate, meaning that you can dispense with the need to perform quality controls on the test kits upon their delivery. The lot certificates, which can also be called up over the internet at www.merck.de/photometry, are capable of being used in connection with audits.

Validation of the analytical methods

Validation here means the checking of the performance characteristics of a given method of analysis. The characteristic data of the test procedures that we obtain in our R&D laboratory – measuring range, lower limit of detection (LLD), accuracy, selectivity, sensitivity, calibration function, robustness of the method – are all documented. These data are quality characteristics and form the basis for quality assurance in routine analysis.



Guaranteed quality

Certificate of the suitability of Spectroquant® test kits for self-monitoring

The characteristic data of the individual test procedures – determined according to standardized processes – are included in every test kit in the form of a quality certificate. This certificate is your guarantee for the consistent quality of all batches that have been delivered so far. Both the quality certificates as well as the lot certificates can be called up for each Spectroquant® test kit in the internet (www.merck.de/photometry).

Measuring range

Working range within which the method delivers reliable results.

Lower limit of detection

is the lowest concentration of a given analyte that still yields a measurement result, on the basis of which the analyte can be presumed to be present with a sufficient statistical probability.

Method detection limit

is that concentration of the analyte that yields a measurement result, on the basis of which the analyte can be presumed to be present with a high statistical probability (equivalent to the lower limit of the measuring range).

Confidence interval

Every measurement result entails a certain degree of error, even the measurement results of the calibration curve; the confidence interval is that range in which the "true" curve lies.

Standard deviation of the method

An absolute measure of the precision.

Variation coefficient of procedure

A relative measure of the precision.

Accuracy

Measure for approximation of the measurement result to the "true" value.

| Spectroquant® CSB-Kuvettentest, Art.-Nr. 1.14500 | |
|--|--------------------|
| Spectroquant® COD Cell Test, Cat. No. 1.14540 | |
| Messbereich / Measuring Range | 10 mg/l CSB/COD |
| Nachweisgrenze | 50 mg/l CSB/COD |
| Lower Limit of Detection (LLD) | 10 mg/l CSB/COD |
| Bestimmungsgrenze | ± 3 mg/l CSB/COD |
| Method Detection Limit (MDL) | ± 1.0 mg/l CSB/COD |
| Vertrauensbereich (95 % Wahrscheinlichkeit) | ± 1.0 % |
| Confidence Interval (P = 95 % Wahrscheinlichkeit) | ± 1.0 % CSB/COD |
| Vertikalstandardabweichung (standard deviation) | ± 1.0 mg/l CSB/COD |
| Standard Deviation of Procedure (standard deviation) | ± 1.0 mg/l CSB/COD |
| Vertikalvariationskoeffizient (variation coefficient) | ± 1.0 % |
| Variation Coefficient of Procedure (variation coefficient) | ± 1.0 % |
| Anzahl Produktionschargen zur Berechnung | 16 |
| Number of Lots for Calculation | 16 |
| Genauigkeit / Accuracy | ± 1.0 mg/l CSB/COD |

Merck KGaA, Darmstadt, 02.01.2001
Dr. Julia Köthe
Merck KGaA, 64271 Darmstadt, Germany

Simply. Consistent.

“Our tools enable you to test your entire analytical operation.”

It is a general rule that measurement values are subject to a degree of error. Only by consistent quality assurance can your measurement values become secure and reproducible analytical results. Analytical Quality Assurance (AQA) means that your analytical operations are officially recognized.

The individual components that make up our professional AQA concept are well-tried means for your internal quality control (IQC) area, such as are demanded, for example, in the M 704/1-2 data sheet of the German Association for Wastewater Technology.

AQA without any compromises

A consistent quality control must encompass the entire system, checking not only the working materials, but also the working method itself. We put the appropriate tools in your hand for this purpose. You yourself decide at which time intervals and for which parameters the Analytical Quality Assurance tests are to be carried out.

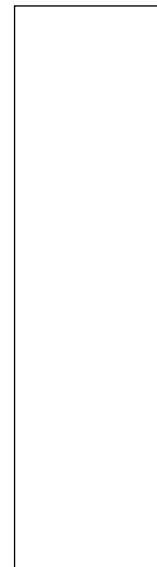
In the **AQA1** mode the photometer is checked using certified colour standards (Spectroquant® PhotoCheck).

In the **AQA2** mode the entire system is checked completely by means of certified multiparameter standards (Spectroquant® CombiCheck).

The **AQA3** mode demands the quality assurance of the entire system. By entering a combination of numbers (private code) you can ensure that the photometer refuses to perform any further measurements in the event that the prescribed quality-control measurements have not been carried out, and the method is released for measurements again only after the quality check has been successfully performed. This is internal quality assurance in perfection.

If the performed quality check fails to fulfil the required specifications, the results of all analyses run since the previous check must be considered doubtful. Checks run at regular intervals help prevent this insecurity factor.

We make things easy for you. The necessary tools for checking the equipment and the entire analysis system are available ready for direct use.



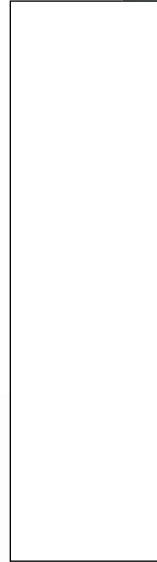


Tested quality

AQA 2 [4w]:
next AQA check
in 4 weeks

**Documentation
from start to finish**

The Analytical Quality Assurance measures are documented according to GLP requirements in the measurement protocol. After the quality-control measures have been carried out, each measurement value is given the suffix "AQA". This safely documents that the system has been checked.



AQA 3 Mode:
password is the
security code



Checking the photometer
Spectroquant® PhotoCheck

The photometers must be checked for their wavelength accuracy and the linearity of the absorbance measurements. Spectroquant® PhotoCheck is an all-in-one test kit containing long-term stable colour solutions. This test medium can be traced back to international standards, a feature that is guaranteed by checking the solutions in a reference spectrophotometer. This in turn is checked using primary standards (NIST standards).

Spectroquant® PhotoCheck is thus suited as a secondary standard for checking test media according to DIN EN ISO 9001 resp. 14001.


Checking the pipettes
Spectroquant® PipeCheck

Pipettes must also be checked regularly in connection with internal quality control measures. Conventionally the test is performed by weighing the liquid volume on certified precision balances. But then again, not everyone has such balances at his ready disposal.

With Spectroquant® PipeCheck you can check your pipettes and document the values measured by the photometer. This is an important contribution towards securing accurate measurement results.

Checking the thermoreactor
Thermosensor for TR 420 / 620

The temperature sensor measures the current temperature in the thermoreactor bore; this temperature is then compared with the specified temperature. The results can be saved on a PC via a special data cable.

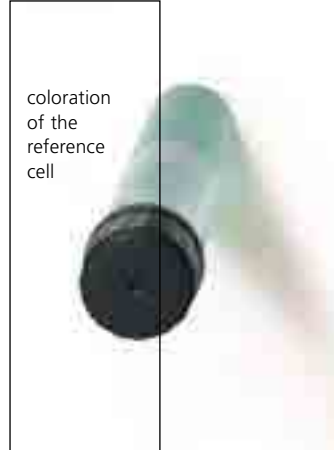


"Check 5 ml"
Cell

+

5.0 ml
pipette
volume

⇒



coloration of
the
reference
cell

Order Information

| Cat. No. | Designation |
|--------------|-----------------------------|
| 1.14693.0001 | Spectroquant® PhotoCheck |
| 1.14962.0001 | Spectroquant® PipeCheck |
| 1.71203.0001 | Thermosensor for TR 420/620 |
| 1.71204.0001 | PC cable for TR 420/620 |
| 1.14676.0001 | Spectroquant® CombiCheck 10 |
| 1.14675.0001 | Spectroquant® CombiCheck 20 |
| 1.14677.0001 | Spectroquant® CombiCheck 30 |
| 1.14692.0001 | Spectroquant® CombiCheck 40 |
| 1.14695.0001 | Spectroquant® CombiCheck 50 |
| 1.14696.0001 | Spectroquant® CombiCheck 60 |
| 1.14689.0001 | Spectroquant® CombiCheck 70 |
| 1.14738.0001 | Spectroquant® CombiCheck 80 |

Simply. Correct.

“Correct analysis results don’t come about by magic.”

Tested quality

Checking the entire system **Spectroquant® CombiCheck**

When it comes to checking the overall system – the test kit itself, sample pretreatment, measurement device, your own working procedures – the multiparameter standard solutions with their precisely known content of the respective analytes are ideally suited. These standards can be traced back directly to an international standard (NIST).

Each CombiCheck pack contains a standard solution and an addition solution. If the check yields the redefined concentration of the standard solution, then the entire analysis system is in perfect working order. If there is any deviation from this value, the cause of the error must be determined.

Using the addition solution enables measurement errors caused by the matrix to be recognized (e.g. the presence of interfering substances). If the recovery rate is insufficient, the sample solution must be correspondingly diluted or treated otherwise to eliminate the interference.

Standard solutions

Our comprehensive range of ready-to-use standard solutions is naturally also at your disposal. Simply by making the corresponding dilutions, you can prepare your own standards for virtually all parameters in any concentration you wish.

Spectroquant® CombiCheck 10
for the determination of COD, ammonium, nitrate, phosphate, chloride, and sulfate in slightly contaminated wastewater

Spectroquant® CombiCheck 20
for the determination of COD, ammonium, nitrate, phosphate, chloride, and sulfate in heavily contaminated wastewater

Spectroquant® CombiCheck 30
for the determination of cadmium, iron, copper, and manganese

Spectroquant® CombiCheck 40
for the determination of aluminium, lead, chromate, nickel, and zinc

Spectroquant® CombiCheck 50
for the determination of low concentrations of COD, ammonium, and nitrogen

Spectroquant® CombiCheck 60
for the determination of COD, and chloride

Spectroquant® CombiCheck 70
for the determination of high concentrations of COD, ammonium, and nitrogen

Spectroquant® CombiCheck 80
for the determination of high concentrations of COD, nitrate, and phosphate



Simply. Safe.

“Documented data are secured data.”

A consistent documentation gives you a sense of security.

Spectroquant® photometers feature high-capacity memories. Saved data can be printed out directly or shown and processed on the PC. This gives you security as demanded by DIN EN ISO 9001 and also comfort when it comes to processing the data further.



The measurement-result memory

The memories of the Spectroquant® photometers can store up to 1000 different data sets over the long term. The results are automatically recorded together with the corresponding date and time. This ensures that your measurements are documented and verifiable from start to finish.

| No. of meas. value | I.D. number | De |
|--------------------|-------------|------|
| 010 | 00613 | 15. |
| 009 | 14543 | 15. |
| 008 | 14543 | 15. |
| 007 | 14544 | 15. |
| 006 | 14828 | 15.0 |
| 005 | 14558 | 15.0 |
| 004 | 14555 | 15.0 |
| 003 | 14541 | 15.0 |
| 002 | 14541 | 15.0 |
| 001 | 14729 | 15.0 |



Data processing

Measurement results can be effortlessly transferred from the photometer to your PC using the Multi-Achat II software package. These data can then be saved and processed by PC, for example using Excel. Statistical evaluations and graphic presentation of the measurement data are thus made as easy as ABC.



The printers

There are graphics-capable printers available for the presentation of your results. The measurement results are all recorded in a readily surveyable manner along with the date, the time, the test name, and an individual identity number. Standard curves as well as continuous-flow measurements can be displayed directly on the graphics printer.

| Time | meas. value | Unit |
|----------|-------------|------|
| 12:12:43 | 5.7 | |
| 12:10:11 | 1.30 | |
| 12:07:53 | 2.50 | |
| 12:05:12 | 13.5 | |
| 12:03:50 | 2.1 | |
| 12:00:05 | 6.2 | |
| 11:48:35 | 5010 | |
| 11:46:33 | 120 | |
| 11:44:21 | 282 | |
| 11:42:53 | 20.3 | |

Order Information

| Cat. No. | Designation |
|--------------|--------------------------|
| 1.09753.0001 | Graphics-capable printer |
| 1.09759.0001 | Printer cable |
| 1.14964.0001 | Software Multi-Achat II |
| 1.14667.0001 | PC cable for photometers |

Simply. Competent.

“Service and applications are essential components of Analytical Quality Assurance.”

All over the world we offer our customers a comprehensive range of services, from professional training via practically related application consultation all the way to environmentally compatible disposal.

On-the-spot advice

In addition to on-the-spot analytical advice and technical instruction by our local experts, in virtually every country around the world our telephone hotline is ready to deal with your problems in a competent and practically oriented manner. Your inquiries are answered immediately or else passed on to our development specialists.

Training and seminars

Regularly held seminars give users practical tips and tricks for analysis and help avoid handling-related errors in the day-to-day laboratory routine. These training courses and seminars are all run with only a restricted number of participants, thus guaranteeing an intensive exchange of experience. The questions raised by the participants are dealt with extensively and individually.

Internet

Simply surf the internet for detailed information on our products, applications, and services. Click on our internet site www.merck.de/photometry to download the most recent method data and operating instructions for our photometers free of charge. Besides this, quality certificates, lot certificates, and special applications are also to be found here. A product overview titled “Photometric Test Kits from A – Z” provides you with all the information you need on our products.



Our service

Applications

Our Spectroquant® System can be used directly for the analysis of drinking water and for “routine” wastewater analysis. There are, however, certain areas of application – for example the determination of calcium in milk, of chloride in concrete, or of phosphorus in waste-dump run-off water – that demand special sample-preparation measures. To enable you to perform such analyses with ease, we have over 250 ready-for-use applications that can help you fulfill your assignments, with further applications being added to this range all the time.

Disposal

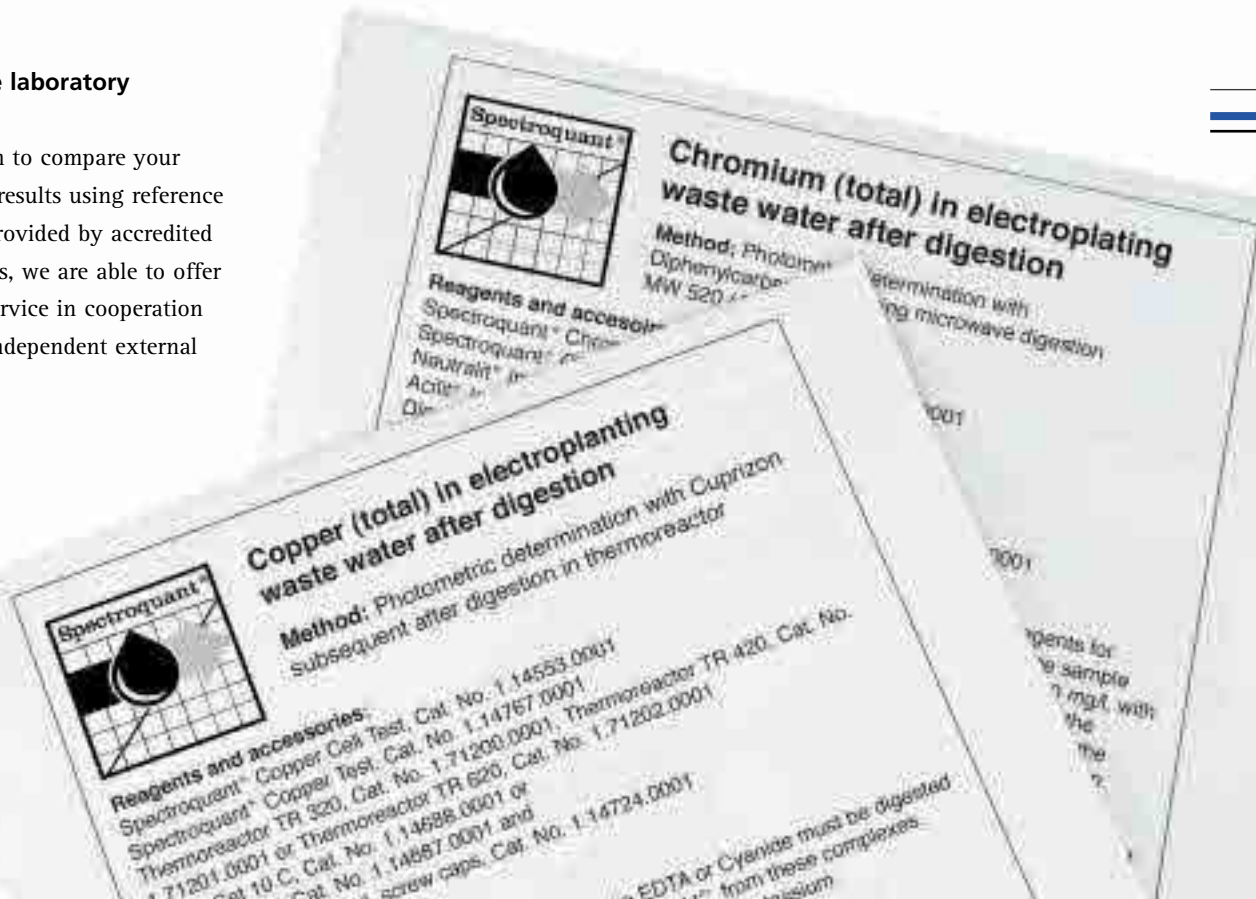
We take the aspect of environmental protection seriously from the very outset, right at the beginning of the development of new products, using safe and environmentally compatible methods. The recycling of used reagents is already planned in the product-development phase. In this connection Merck has established a comprehensive and customer-oriented concept for the entire Spectroquant® line. Not only the used packaging materials, but also the used chemicals and reagents themselves are either re-utilized in an environmentally compatible way or else disposed of according to state-of-the-art technical standards.

Safety information

We keep a comprehensive stock of literature available for our customers on a wide variety of analytical problems. Merck offers the widest product range worldwide, and enjoys the international reputation of having the greatest competence in the area of chemical analysis. Make use of our know-how in this field. Various publications provide you with a rapid and up-to-date overview of environmental-analysis issues. Extensive Safety Data Sheets covering each and every safety-related aspect are also available on request, both in hard copy as well as on electronic media.

Reference laboratory

If you wish to compare your analytical results using reference methods provided by accredited laboratories, we are able to offer you this service in cooperation with our independent external partners.



Merck is represented worldwide with more than 190 companies. Please contact your local Merck or Merck dealer for inquiries and order information.

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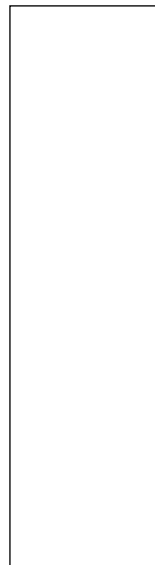
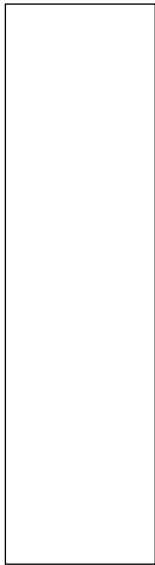
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