



Water Test • Chlorine

Reagent-Test for Determination of free Chlorine, total Chlorine (DPD) and pH value

Principle

Determination of free chlorine and total chlorine after formation of a red violet dye with N,N-diethyl-1,4-phenylenediamine (DPD). The evaluation can be done colorimetric (visual comparison of the color of the measuring solution with a color scale) or spectrophotometric.

The pH is determined by means of a chlorine-insensitive phenol red indicator solution, the color of which is within the pH range of 6.0 ... 8.0 changes from yellow to red violet.

Measuring range

Cl₂: 0.05 ... 6.00 mg/L

Reagents

The reagents are ready for use and originally sealed at a storage temperature of +5 ... 20 °C until the imprinted expiration date. Do not leave the reagent bottles open (danger of oxidation of the DPD by atmospheric oxygen), but close them immediately after use with the cap of the same colour code.

Risks and Safety

Please observe the necessary precautions for use of laboratory reagents. Applications should be performed by expert personnel only. Follow the national and laboratory internal guidelines for work safety. Wear suitable protective clothing, safety eyewear and disposable gloves while handling.



For additional safety information please refer to the information on the label and the corresponding Safety Data Sheet (SDS).

Download by QR-Code or link:

- 072041-... www.sds-id.com/100132-3
- 072042-... www.sds-id.com/100133-2
- 072043-... www.sds-id.com/100134-1
- 072044-... www.sds-id.com/100135-0

Main Components/Contents

- 072040-6001 KIT 3 Water Test Chlorine (free + total)
Reagent 2x A1, 1x A2, 1x B.
- 072040-6002 KIT 4 Water Test Chlorine (free + total + pH)
Reagent 1x A1, 1x A2, 1x B, 1x pH.
- 072041-0030 A1 1x 30mL Buffer Chlorine free + total + Ozone
- 072042-0030 A2 1x 30mL Reagent Chlorine free + total + Ozone
- 072043-0030 B 1x 30mL Reagent Chlorine total
- 072044-0030 pH 1x 30mL Reagent pH-Indicator

Sold separately

- 072044-0030 pH 1x 30mL Reagent pH-Indicator
- 072047-0030 O3 1x 30mL Reagent Ozone

Additional materials required or recommended

- 035180-1010 1x 1.0L 1.0N Sulphuric acid
- 035110-1010 1x 1.0L 1.0N Sodium hydroxide
- 002529-1010 1x 1.0L Sodium hypochlorite solution (0.5%)

Specimen

Fresh water sample (< 1 h, storage dark and cool, avoid shaking, free of turbidity and particles). *1)

Reference Ranges

Chlorine [2] *3)	mg/l free chlorine	mg/l bound chlorine
Swimming and bathing pool:	0.3 ... 0.6	< 0.2
Warmwater Jacuzzi:	0.7 ... 1.0	< 0.2
Plunge pools:	0.3 ... 0.6	
Drinking water usual:	0.1 ... 0.2	
Drinking water Limit:	≤ 0.3	

Preparation

Rinse all test devices several times with the sample before use. Use glassware that does not consume chlorine. *2)

The colouring is formed at a pH value of 6.3...6.5 The reagents contain a buffer for pH value adjustment, strongly alkaline or acidic samples should however be adjusted to a pH value of 4...8.

For zero adjustment in spectrophotometric determination, use a sample without the addition of reagents.

Important note

Do not swap bottle closures, as this will make the reagents unusable. Pay attention to the colour coding.

For reusable cuvettes, label and separate them strictly for free chlorine (cuvette 1) and total chlorine (cuvette 2). Reagent B should never enter cuvette 1! Reagents must have reached the measuring temperature +20 ... +37 °C before use. Mix before use.

Procedure chlorine determination

Measurement

- Wavelength:..... 510nm* oder 530 nm**
- Cuvette: 10mm
- Temperature:..... +20...+37°C
- Type of measurement:..... Endpoint

* Extinction maximum

** Common wavelength for small photometers (LED wavelength).

Measuring value 1 = Determination of free chlorine [mg/L]

Prepare the measuring mixture as shown in the following table. To do this, hold dropper bottles vertically during addition and add drops of the same size by pressing slowly.

Measuring mixture in cuvette 1:		up to 3mg/L Cl ₂	up to 6mg/L Cl ₂
SA	Sample	10mL	10mL
A1	Reagent	Drops 3x	6x
A2	Reagent	Drops 3x	6x

Mix well, wait 1 min, complete measurement.

Measuring value 2 = Determination of total chlorine [mg/L]

Prepare the measuring mixture as shown in the following table. To do this, hold dropper bottles vertically during addition and add drops of the same size by pressing slowly.

Measuring mixture in cuvette 2:		up to 3mg/L Cl ₂	up to 6mg/L Cl ₂
SA	Sample	10mL	10mL
A1	Reagent	Drops 3x	6x
A2	Reagent	Drops 3x	6x
B	Reagent	Drops 3x	6x

Mix well, wait 2 min, complete measurement.

Combination Measurement 1 + 2

Care should be taken that not too much time passes between the measurements, because due to the oxygen in the air the DPD is oxidized if the tool life is too long and higher measured values are obtained.

Combination Measurement with disposable cuvettes

Prepare the measuring mixture as shown in the following table. To do this, hold dropper bottles vertically during addition and add drops of the same size by pressing slowly.

Measuring mixture in disposable cuvette:		up to 3 mg/l Cl ₂	up to 6 mg/l Cl ₂
SA	Sample	10 mL	10 mL
A1	Reagent	Drops 3 ×	6 ×
A2	Reagent	Drops 3 ×	6 ×

Gut mischen, 1 min warten, Messung sofort durchführen. Sofort danach zugeben:

B	Reagent	Drops 3 ×	6 ×
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Mix well immediately, wait 2 min, complete measurement.

Combination Measurement with reusable cuvettes

This procedure is not so accurate and should only be used for orientation. Prepare the measuring mixture as shown in the following table. To do this, hold dropper bottles vertically during addition and add drops of the same size by pressing slowly.

Measuring mixture in cuvette 1:		up to 3 mg/l Cl ₂	up to 6 mg/l Cl ₂
SA	Sample	10 mL	10 mL
A1	Reagent	Drops 3 ×	6 ×
A2	Reagent	Drops 3 ×	6 ×

Mix well, wait 1 min, complete measurement immediately.
Then proceed immediately as follows:

Measuring mixture in cuvette 2:		up to 3 mg/l Cl ₂	up to 6 mg/l Cl ₂
B	Reagent	Drops 3 ×	6 ×

First drop Reagent B into cuvette 2 and then transfer the contents of cuvette 1 into cuvette 2. Immediately mix well, wait 2 min, complete measurement.

Analysis / Calculation

Visual-comperative

After complete colour formation, the colour of the test solution is compared with the colour scale of a comparator for this method and the corresponding Cl₂ concentration is read off in mg/l.

If the color of the test sample corresponds to the darkest color of the scale or if it is more intense, the measurement must be repeated with a fresh, diluted sample.

The dilution must be taken into account during evaluation:

$$\text{Measured value} \times \text{Dilution Factor} = \text{mg/L Chlorine}$$

Hold the mass comparator for visual comparison so that light falls on the samples from behind.

Spectrophotometric (recommended method)

The measured absorbance multiplied by a previously determined factor gives the Cl₂ concentration in mg/L (ppm).

$$E_{510} \times \text{Factor} = \text{mg/L Cl}_2$$

$$E_{530} \times \text{Factor} = \text{mg/L Cl}_2$$

$$\text{mg/L} = \text{ppm}$$

Method-specific factors are also stored in water-analytical photometers. Photometers with factor already stored directly display the Cl₂ concentration as the measurement result ⁴⁾.

If necessary, it is recommended to check the factor for each type of instrument by measuring with standard solution.

Calculation of bound chlorine

The bound chlorine content is calculated as follows:

$$\text{mg/l bound Chlorine} = \text{mg/l total Chlorine} - \text{mg/l free Chlorine}$$

Determination of pH

Please refer to the separate instructions for Water Test pH (072044-PR01).

Notes

General

For the determinations, either use disposable items (and really use them only once) or, in the case of reusable glassware, rinse well after each determination with approx. 1 N sulphuric acid and then with distilled water to avoid carry-over.

During spectrophotometric measurement, make sure that the cuvette is free of dirt and scratches or fingerprints.

All oxidizing agents present in the sample react analogously to the chlorine/ozone to be determined and therefore lead to higher analysis results. Examples of such compounds are: Bromine, iodine, bromamine, chlorine dioxide, hydrogen peroxide, nitrite, manganese dioxide, chromate, iron(III) or copper ions. However, the concentrations of these compounds are normally so low that they do not carry any weight. If anomalies or discrepancies are observed during the analysis, disturbances of this kind should be considered and, if necessary, removed.

Support / Information service

For methodological and technical support, please contact us by E-Mail at support@bioanalytic.de (German, English).

Periodically check for updates of this product information on our website.

Feedback

Information from users can be reported to support@bioanalytic.de (German, English).

Suggestions for further developments will be considered.

Waste Management

Please observe your national laws and regulations.

Used and expired solutions must be disposed of in accordance with your local regulations.

Inside the EU, national regulations apply that are based on the current, amended version of Council Directive 67/548/EEG on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances.

Decontaminated packaging can be disposed of as household waste or recycled, unless otherwise specified.

Literature & Footnotes

Legends for the graphic symbols and tags used follow relevant norms or are available on our internet pages.

- [1] DIN 7393-2:2000-04, Water quality - Determination of free and total chlorine. Part 2: Colorimetric method with *N,N*-Diethyl-1,4-phenyldiamin for routine checks.
- [2] DIN 19643-1:2012-11, Treatment of swimming and bathing pool water. Part 1: General requirements.
 - *1) Particles and turbidity can lead to interference during spectrophotometric measurement. To detect interference from particles, it is recommended to perform multiple measurements of a sample and check for agreement. Perform filtration if necessary.
 - *2) Chlorine-consumption-free glassware can be obtained by placing the glassware in sodium hypochlorite solution (0.5 %). Remove after 1 hour and rinse thoroughly with tap water and then distilled water.
 - *3) Recherchierte Angaben. Beachten Sie die gesetzlichen Vorschriften und Verordnungen Ihres jeweiligen Landes.
 - *3) Researched data. Observe the legal regulations and ordinances of your respective country.
 - *4) See the instructions for use of the photometer manufacturer