

# Lovibond® Water Testing

Tintometer® Group



## Manual of Methods

MD 100 • MD 110 • MD 200

Chlorine | pH

**(EN) Manual of Methods**

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**(ES) Manual de Métodos**

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**(IT) Manuale dei Metodi**

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**(NL) Handboek Methoden**

Zijde 160

**(DE) Methodenhandbuch**

Seite 30

**(FR) Méthodes Manuel**

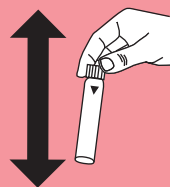
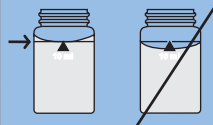
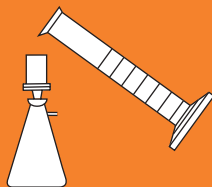
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**(PT) Métodos Manual**

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**(ZH) 方法手册**

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KS4.3 T / 20



**Method name** → KS4.3 T

**Method number** → 20

**Bar code for the detection of the methods** → [Barcode]

**Measuring range** → 0.1 - 4 mmol/l  $K_{S4.3}$

**Acid / Indicator** → S:4.3

**Chemical Method** → [Method Name]

**Display in the MD 100 / MD 110 / MD 200** → [Method Name]

**Instrument specific information**

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

Instrument Type	Cuvette	$\lambda$	Measuring Range
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	610 nm	0.1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	ø 24 mm	615 nm	0.1 - 4 mmol/l $K_{S4.3}$

**Material**

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Alka-M-Photometer	Tablet / 100	513210BT
Alka-M-Photometer	Tablet / 250	513211BT

**Application List**

- Waste Water Treatment
- Drinking Water Treatment
- Raw Water Treatment

**Notes**

1. The terms Alkalinity-m, m-Value, total alkalinity and Acid demand to  $K_{S4.3}$  are identical.
2. For accurate results, exactly 10 ml of water sample must be used for the test.

**Language codes ISO 639-1** → EN Handbook of Methods 01/20

**Revision status** → [Revision Status]

Performing test procedure

### Implementation of the provision Acid capacity $K_{S4.3}$ with Tablet

Select the method on the device

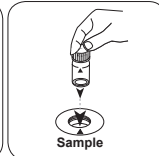
For this method, no ZERO measurements are to be carried out with the following devices: XD 7000, XD 7500



Fill 24 mm vial with **10 ml sample**.

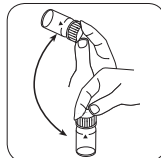


Close vial(s).

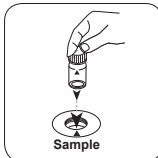


Place **sample vial** in the sample chamber. • Pay attention to the positioning.

• • •



Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.

The result in Acid Capacity  $K_{S4.3}$  appears on the display.



Chlorine T

M100

0.01 - 6.0 mg/L Cl<sub>2</sub> <sup>a)</sup>

CL6

DPD

## Material

EN

Required material (partly optional):

Title	Verpackungseinheit	Part Number
DPD No. 1	Tablet / 100	511050BT
DPD No. 1	Tablet / 250	511051BT
DPD No. 1	Tablet / 500	511052BT
DPD No. 3	Tablet / 100	511080BT
DPD No. 3	Tablet / 250	511081BT
DPD No. 3	Tablet / 500	511082BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablet / 100	515740BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablet / 250	515741BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablet / 500	515742BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablet / 100	515730BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablet / 250	515731BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablet / 500	515732BT
DPD No. 4	Tablet / 100	511220BT
DPD No. 4	Tablet / 250	511221BT
DPD No. 4	Tablet / 500	511222BT
DPD No. 3 EVO	Tablet / 100	511420BT
DPD No. 3 EVO	Tablet / 250	511421BT
DPD No. 3 EVO	Tablet / 500	511422BT
DPD No. 4 EVO	Tablet / 100	511970BT
DPD No. 4 EVO	Tablet / 250	511971BT
DPD No. 4 EVO	Tablet / 500	511972BT
Refill Pack Scuba II	1 pc.	525600

## Available Standards

Title	Verpackungseinheit	Part Number
ValidCheck Chlorine 1,5 mg/l	1 pc.	48105510



## Sampling

1. When preparing the sample, Chlorine outgassing, e.g. through the pipette or shaking, must be avoided.
2. The analysis must take place immediately after taking the sample.

## Preparation

1. Cleaning of vials:  
As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results with the determination of Chlorine. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L) for one hour and then rinsed thoroughly with deionised water.
2. For individual testing of free and total Chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3)
3. The DPD colour development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment. Strong alkaline or acidic water samples must therefore be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

## Notes

1. EVO tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No. 3 EVO instead of DPD No. 3).



## Implementation of the provision free chlorine with tablet

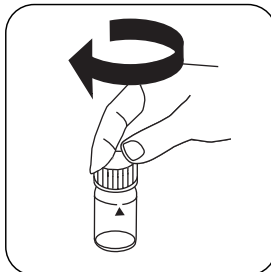
Select the method on the device

In addition, choose the test: free

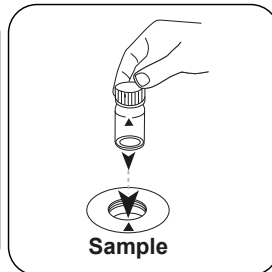
EN



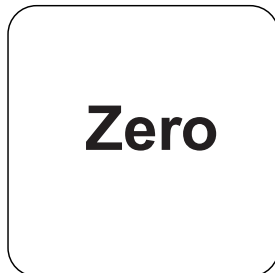
Fill 24 mm vial with **10 ml sample**.



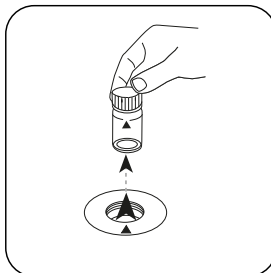
Close vial(s).



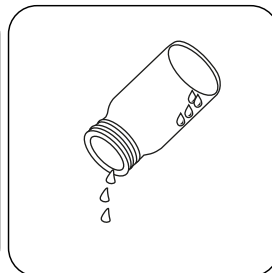
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



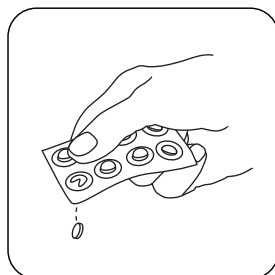
Press the **ZERO** button.



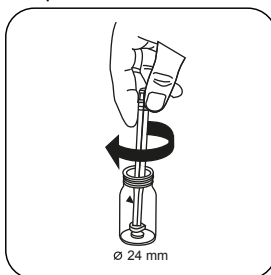
Remove the vial from the sample chamber.



Empty vial except for a few drops.



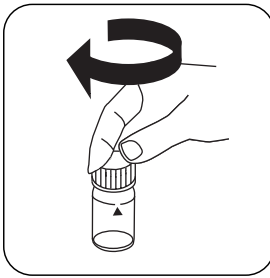
Add **DPD No. 1 tablet**.



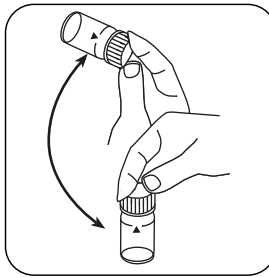
Crush tablet(s) by rotating slightly.



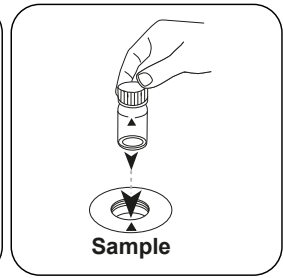
Fill up vial with **sample** to the **10 ml** mark.



Close vial(s).



Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.

EN

# Test

Press the **TEST** (XD: **START**) button.

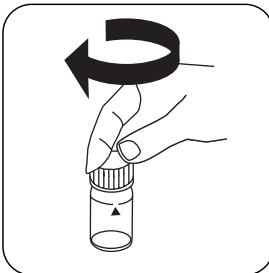
The result in mg/l free chlorine appears on the display.

## Implementation of the provision total Chlorine with tablet

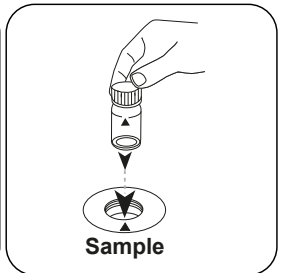
Select the method on the device  
In addition, choose the test: total



Fill 24 mm vial with **10 ml sample**.



Close vial(s).



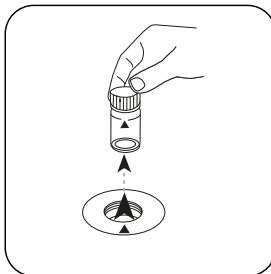
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



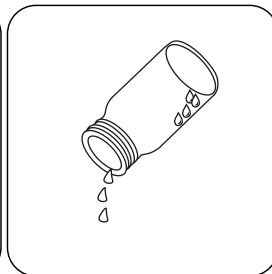


# Zero

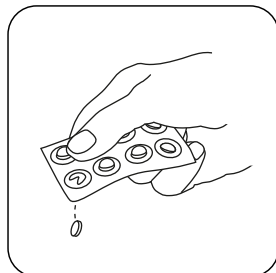
Press the **ZERO** button.



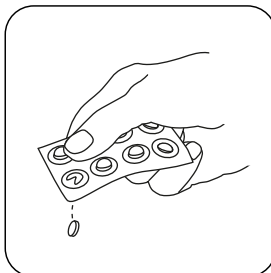
Remove the vial from the sample chamber.



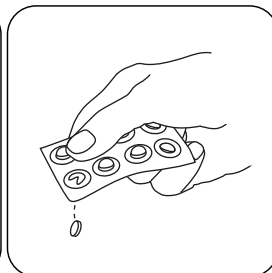
Empty vial except for a few drops.



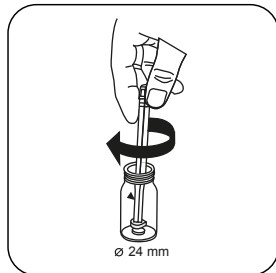
Add **DPD No. 1** tablet .



Add **DPD No. 3** tablet .



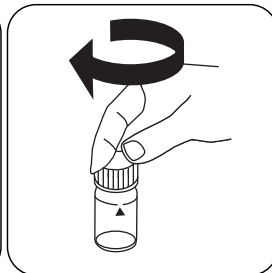
As an alternative to **DPD No. 1** and **No. 3** tablets, a **DPD No. 4** tablet can be added.



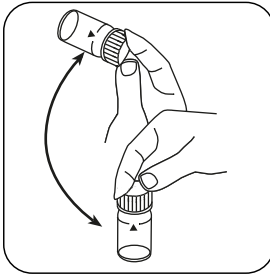
Crush tablet(s) by rotating slightly.



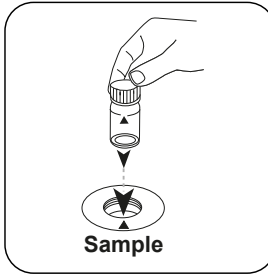
Fill up vial with **sample** to the **10 ml** mark.



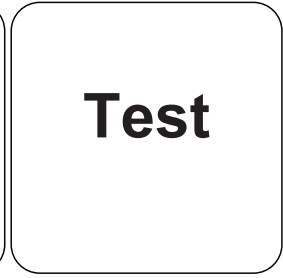
Close vial(s).



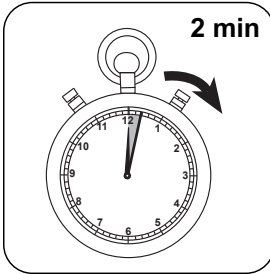
Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically. The result in mg/l total Chlorine appears on the display.



## Chemical Method

DPD

## Appendix

EN

### Interferences

#### Persistent Interferences

- All oxidising agents in the samples react like chlorine, which leads to higher results.

#### Removeable Interferences

- Interference from Copper and Iron (III) are eliminated by the addition of EDTA.
- The use of reagent tablets in samples with high Calcium content\* and/or high conductivity\* can lead to turbidity of the sample and therefore incorrect measurements. In this case, the alternative reagent tablet DPD No. 1 High Calcium and reagent tablet DPD No. 3 High Calcium should be used.  
\*it is not possible to give exact values, because the development of turbidity depends on the composition and nature of the sample.
- Concentrations above 10 mg/L Chlorine, in the event of using fluid reagents, can lead to results within the measuring range of up to 0 mg/L. In the event of a high concentration of Chlorine, the sample must be diluted with chlorine-free water. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

### Method Validation

Limit of Detection	0.02 mg/L
Limit of Quantification	0.06 mg/L
End of Measuring Range	6 mg/L
Sensitivity	2.05 mg/L / Abs
Confidence Intervall	0.04 mg/L
Standard Deviation	0.019 mg/L
Variation Coefficient	0.87 %

#### Conformity

EN ISO 7393-2



<sup>a)</sup> determination of free, combined and total | <sup>a)</sup> alternative reagent, used instead of DPD No.1/No.3 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity

**Chlorine L****M101****0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD****Material**

EN

Required material (partly optional):

<b>Title</b>	<b>Verpackungseinheit</b>	<b>Part Number</b>
DPD 1 Buffer Solution, Blue Bottle	15 mL	471010
DPD 1 Buffer Solution	100 mL	471011
DPD 1 Buffer Solution	1 pc.	471016
DPD 1 Reagent Solution, Green Bottle	15 mL	471020
DPD 1 Reagent Solution	100 mL	471021
DPD 1 Reagent Solution	1 pc.	471026
DPD 3 Solution, Red Bottle	15 mL	471030
DPD 3 Solution	100 mL	471031
DPD 3 Solution	1 pc.	471036
DPD Reagent Set	1 pc.	471056

**Available Standards**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>Part Number</b>
ValidCheck Chlorine 1,5 mg/l	1 pc.	48105510

**Sampling**

1. When preparing the sample, Chlorine outgassing, e.g. through the pipette or shaking, must be avoided.
2. The analysis must take place immediately after taking the sample.



## Preparation

1. Cleaning of vials:  
As many household cleaners (e.g. dishwasher detergent) contain reducing substances, this can lead to lower results with the determination of Chlorine. To avoid measurement errors, the glassware used should be free of chlorine consumption. To achieve this, all glassware should be placed in a sodium hypochlorite solution (0.1 g/L) for one hour and then rinsed thoroughly with deionised water.
2. For individual testing of free and total Chlorine, the use of different sets of glassware is recommended (EN ISO 7393-2, 5.3)
3. The DPD colour development is carried out at a pH value of 6.2 to 6.5. The reagents therefore contain a buffer for the pH adjustment. Strong alkaline or acidic water samples must therefore be adjusted between pH 6 and pH 7 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).

## Notes

1. After use, ensure the cuvettes are once again closed with the respective same-coloured screw caps.
2. Reagent sets are to be stored in the cool at +6 °C to +10 °C.



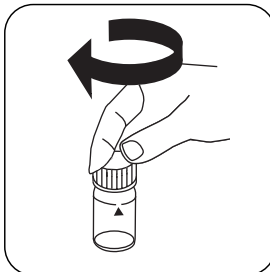
## Implementation of the provision free chlorine with liquid reagent

Select the method on the device

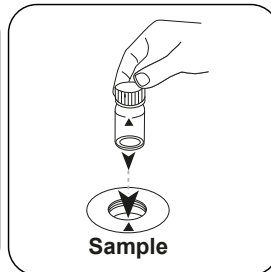
In addition, choose the test: free



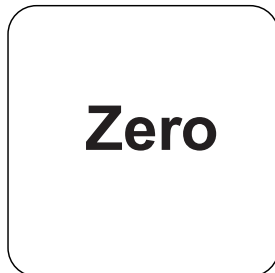
Fill 24 mm vial with **10 ml sample**.



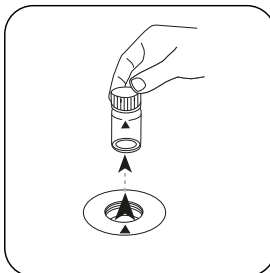
Close vial(s).



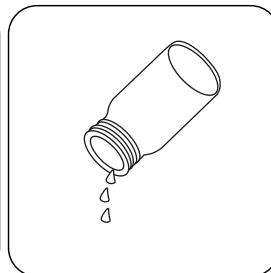
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



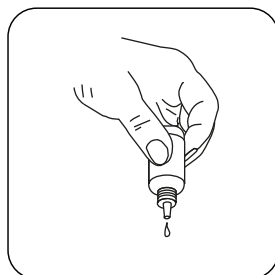
Press the **ZERO** button.



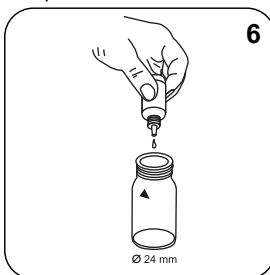
Remove the vial from the sample chamber.



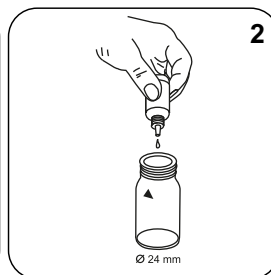
Empty vial.



Hold cuvettes vertically and add equal drops by pressing slowly.



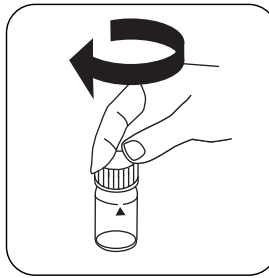
Add **6 drops DPD 1 Buffer Solution**.



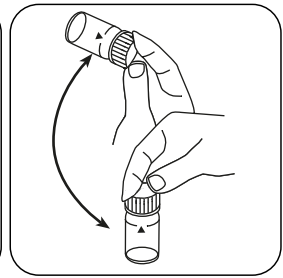
Add **2 drops DPD 1 Reagent Solution**.



Fill up vial with **sample** to the **10 ml** mark.

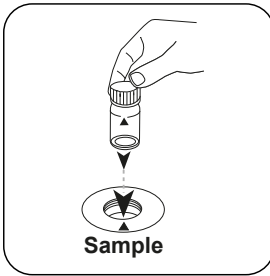


Close vial(s).



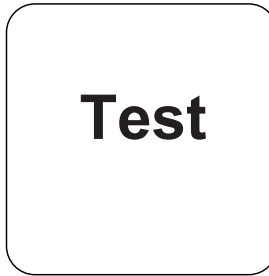
Invert several times to mix the contents.

EN



Place **sample vial** in the sample chamber. • Pay attention to the positioning.

The result in mg/l free chlorine appears on the display.



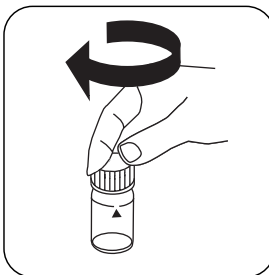
Press the **TEST** (XD: **START**) button.

## Implementation of the provision totale Chlorine with liquid reagent

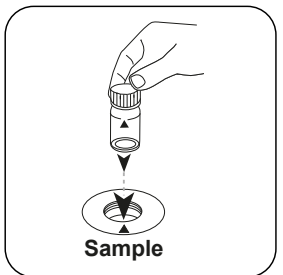
Select the method on the device  
In addition, choose the test: total



Fill 24 mm vial with **10 ml sample**.



Close vial(s).



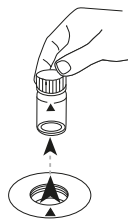
Place **sample vial** in the sample chamber. • Pay attention to the positioning.





# Zero

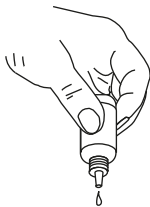
Press the **ZERO** button.



Remove the vial from the sample chamber.



Empty vial.



Hold cuvettes vertically and add equal drops by pressing slowly.



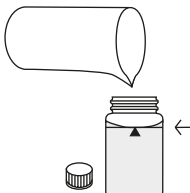
Add **6 drops DPD 1 Buffer Solution.**



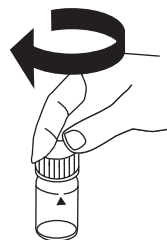
Add **2 drops DPD 1 Reagent Solution.**



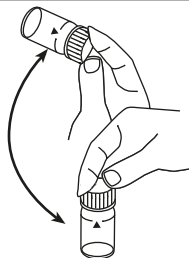
Add **3 drops DPD 3 Solution .**



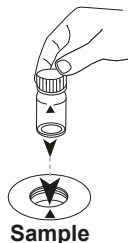
Fill up vial with **sample** to the **10 ml** mark.



Close vial(s).



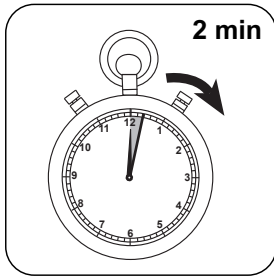
Invert several times to mix the contents.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.

# Test

Press the **TEST** (XD: **START**) button.



Wait for **2 minute(s)**  
**reaction time.**

Once the reaction period is finished, the measurement takes place automatically.  
The result in mg/l total Chlorine appears on the display.

EN



## Chemical Method

DPD

## Appendix

EN

### Interferences

#### Persistent Interferences

- All oxidising agents in the samples react like chlorine, which leads to higher results.

#### Removeable Interferences

- Interference from Copper and Iron (III) are eliminated by the addition of EDTA.
- Concentrations above 4 mg/L Chlorine, in the event of using fluid reagents, can lead to results within the measuring range of up to 0 mg/L. In this case, the sample must be diluted with chlorine-free water. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again (plausibility test).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0,01
$\text{MnO}_2$	0,01

#### Conformity

EN ISO 7393-2

<sup>a)</sup> determination of free, combined and total





pH-value T

M330

6.5 - 8.4 pH

PH

Phenol Red

EN

## Material

Required material (partly optional):

Title	Verpackungseinheit	Part Number
Phenol Red Photometer	Tablet / 100	511770BT
Phenol Red Photometer	Tablet / 250	511771BT
Phenol Red Photometer	Tablet / 500	511772BT

## Notes

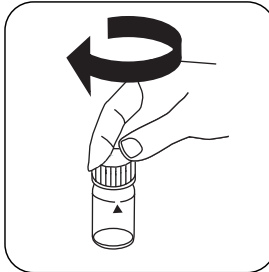
1. For photometric determination of pH values only use PHENOL RED tablets in black printed foil pack and marked with PHOTOMETER.

## Implementation of the provision pH-value with Tablet

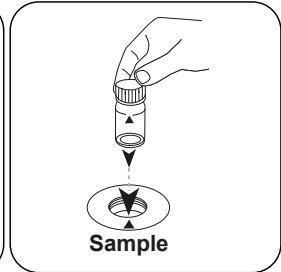
Select the method on the device



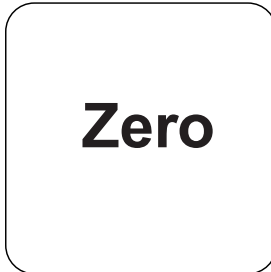
Fill 24 mm vial with **10 ml sample**.



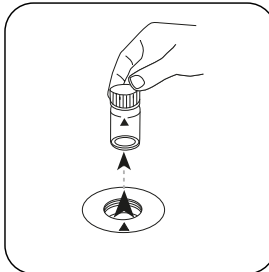
Close vial(s).



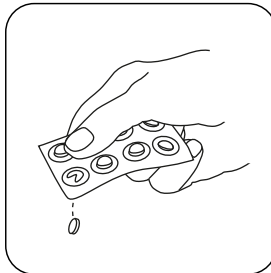
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



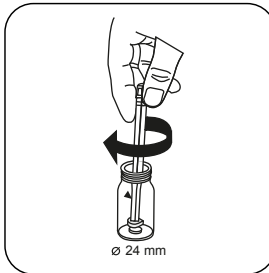
Press the **ZERO** button.



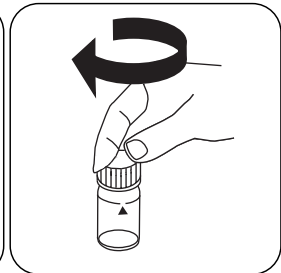
Remove the vial from the sample chamber.



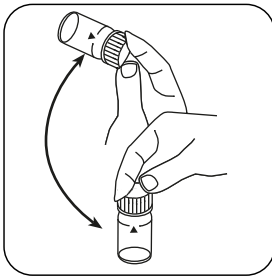
Add **PHENOL RED PHOTOMETER** tablet.



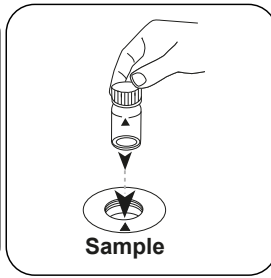
Crush tablet(s) by rotating slightly.



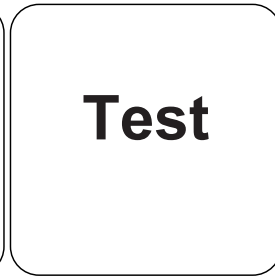
Close vial(s).



Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.

The result in pH value appears on the display.

## Chemical Method

Phenol Red

## Appendix

### Interferences

EN

#### Persistent Interferences

1. Water samples with little Carbonate hardness\* can lead to false pH values.  
\* $K_{S_{4,3}} < 0.7 \text{ mmol/l} \triangleq \text{total alkalinity} < 35 \text{ mg/L CaCO}_3$ .

#### Removeable Interferences

1. pH values below 6.5 and above 8.4 can produce results inside the measuring range. A plausibility test (pH-meter) is recommended.
2. Salt error  
For salt concentrations below 2 g/L, no significant error, is expected due to the salt concentration of the reagent tablet. For higher salt concentrations the measurement values have to be adjusted as follows:

Salt content per sample in g/L	30 (seawater)	60	120	180
Correction	-0.15 <sup>1)</sup>	-0.21 <sup>2)</sup>	-0.26 <sup>2)</sup>	-0.29 <sup>2)</sup>

<sup>1)</sup> according to Kolthoff (1922)

<sup>2)</sup> according to Parson and Douglas (1926)

#### Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London





pH value L

M331

6.5 - 8.4 pH

PH

Phenol Red

EN

## Material

Required material (partly optional):

Title	Verpackungseinheit	Part Number
Phenol Red Solution	15 mL	471040
Phenol Red Solution	100 mL	471041
Phenol Red Solution in 6-pack	1 pc.	471046

## Preparation

1. Due to differing drop sizes results can show a discrepancy in accuracy by comparison with tablets.  
This can be minimised by using a pipette (0.18 ml equivalent to 6 drops).

## Notes

1. After use, ensure the cuvette is once again closed with the same-coloured screw caps.
2. Reagents are to be stored in the cool at +6 °C to +10 °C.

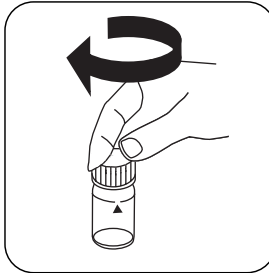


## Implementation of the provision pH-value with fluid reagent

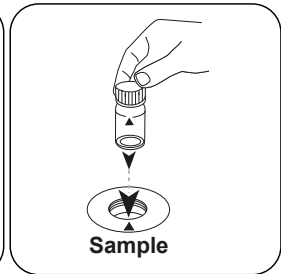
Select the method on the device



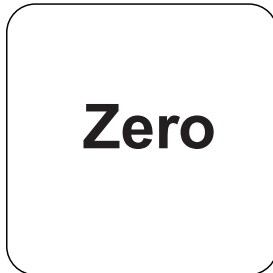
Fill 24 mm vial with **10 ml sample**.



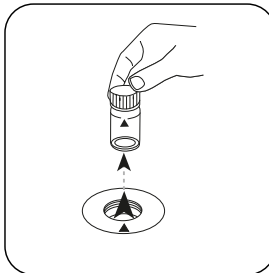
Close vial(s).



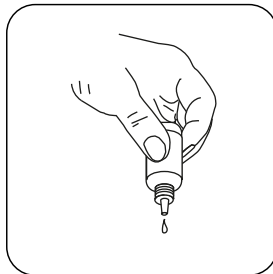
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



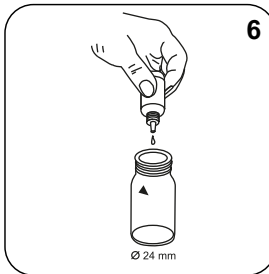
Press the **ZERO** button.



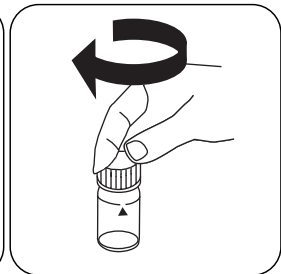
Remove the vial from the sample chamber.



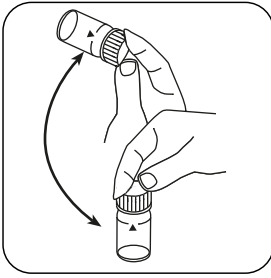
Hold cuvettes vertically and add equal drops by pressing slowly.



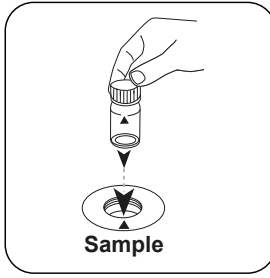
Add **6 drops PHENOL Red-Lösung**.



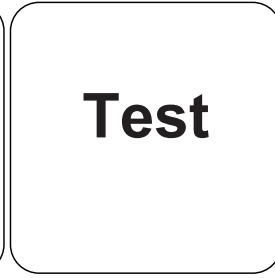
Close vial(s).



Invert several times to mix the contents.



Place **sample vial** in the sample chamber. • Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.

The result in pH value appears on the display.

EN

## Chemical Method

Phenol Red

## Appendix

### Interferences

EN

#### Removeable Interferences


1. Salt error Correction of test results (average values) for samples with salt contents of:

2. Salt content of the sample	Correction
30 g/L (seawater)	-0.15 <sup>1)</sup>
60 g/L	-0.21 <sup>2)</sup>
120 g/L	-0.26 <sup>2)</sup>
180 g/L	-0.29 <sup>2)</sup>
<sup>1)</sup> according to Kolthoff (1922)	<sup>2)</sup> according to Parson and Douglas (1926)

3. When testing chlorinated water the residual chlorine contents can influence the colour reaction of the liquid reagent. This can be avoided by adding a small crystal of Sodiumthiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) to the sample solution before adding the PHENOL RED solution.

#### Bibliography

Colorimetric Chemical Analytical Methods, 9th Edition, London

KS4.3 T / 20


Methoden Name

Methodennummer

Barcode zur Methodenerkennung

Messbereich

20

S:4.3

Chemische Methode

Säure / Indikator

Displayanzeige im MD 100 MD 110 / MD 200

**Instrumentenspezifische Informationen**

Der Test kann auf den folgenden Geräten durchgeführt werden. Zusätzlich sind die benötigte Küvette und der Absorptionsbereich der Photometer angegeben.

Geräte	Küvette	$\lambda$	Messbereich
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	610 nm	0,1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	ø 24 mm	615 nm	0,1 - 4 mmol/l $K_{S4.3}$

**Material**

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
Alka-M-Photometer	Tablette / 100	513210BT
Alka-M-Photometer	Tablette / 250	513211BT

**Anwendungsbereich**

- Abwasserbehandlung
- Trinkwasseraufbereitung
- Rohwasserbehandlung

**Anmerkungen**

1. Die Begriffe Alkalität-m, m-Wert, Gesamtalkalität und Säurekapazität  $K_{S4.3}$  sind identisch.
2. Die exakte Einhaltung des Probevolumens von 10 ml ist für die Genauigkeit des Analyseergebnisses entscheidend.

Sprachkürzel nach ISO 639-1

Revisionsstand

DE Methodenhandbuch 01/20

Durchführung der  
Messung**Durchführung der Bestimmung Säurekapazität  $K_{S4,3}$  mit Tablette**

Die Methode im Gerät auswählen.

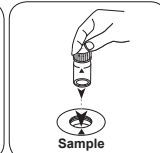
Für diese Methode muss bei folgenden Geräten keine ZERO-Messung durchgeführt werden: XD 7000, XD 7500



24-mm-Küvette mit **10 ml Probe** füllen.

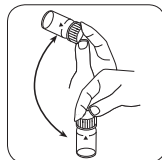


Küvette(n) verschließen.

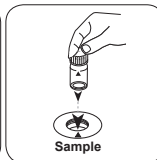


Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

• • •



Tablette(n) durch Umschwenken lösen.



Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



Taste **TEST** (XD: **START**) drücken.

In der Anzeige erscheint das Ergebnis als Säurekapazität  $K_{S4,3}$ .

**Chlor T****M100****0,01 - 6,0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD****Material**

DE

Benötigtes Material (zum Teil optional):

<b>Titel</b>	<b>Verpackungseinheit</b>	<b>Bestell-Nr.</b>
DPD No. 1	Tablette / 100	511050BT
DPD No. 1	Tablette / 250	511051BT
DPD No. 1	Tablette / 500	511052BT
DPD No. 3	Tablette / 100	511080BT
DPD No. 3	Tablette / 250	511081BT
DPD No. 3	Tablette / 500	511082BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablette / 100	515740BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablette / 250	515741BT
DPD No. 1 High Calcium <sup>e)</sup>	Tablette / 500	515742BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablette / 100	515730BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablette / 250	515731BT
DPD No. 3 High Calcium <sup>e)</sup>	Tablette / 500	515732BT
DPD No. 4	Tablette / 100	511220BT
DPD No. 4	Tablette / 250	511221BT
DPD No. 4	Tablette / 500	511222BT
DPD No. 3 EVO	Tablette / 100	511420BT
DPD No. 3 EVO	Tablette / 250	511421BT
DPD No. 3 EVO	Tablette / 500	511422BT
DPD No. 4 EVO	Tablette / 100	511970BT
DPD No. 4 EVO	Tablette / 250	511971BT
DPD No. 4 EVO	Tablette / 500	511972BT
Nachfüllpack Suba II	1 St.	525600

**Verfügbare Standards**

<b>Titel</b>	<b>Verpackungseinheit</b>	<b>Bestell-Nr.</b>
ValidCheck Chlor 1,5 mg/l	1 St.	48105510

## Probenahme

1. Bei der Probenvorbereitung muss das Ausgasen von Chlor, z.B. durch Pipettieren und Schütteln, vermieden werden.
2. Die Analyse muss unmittelbar nach der Probenahme erfolgen.

## Vorbereitung

1. Reinigung der Küvetten:  
Da viele Haushaltsreiniger (z.B. Geschirrspülmittel) reduzierende Stoffe enthalten, kann es bei der Bestimmung von Chlor zu Minderbefunden kommen. Um diesen Messfehler auszuschließen, sollten die Glasgeräte chlorzehrungsfrei sein. Dazu werden die Glasgeräte für eine Stunde unter Natriumhypochloritlösung (0,1 g/L) aufbewahrt und danach gründlich mit VE-Wasser (Vollentsalztes Wasser) gespült.
2. Für die Einzelbestimmung von freiem Chlor und Gesamtchlor ist es sinnvoll, jeweils einen eigenen Satz Küvetten zu verwenden (siehe EN ISO 7393-2, Abs. 5.3).
3. Die DPD-Farmentwicklung erfolgt bei einem pH-Wert von 6,2 bis 6,5. Die Reagenzien enthalten daher einen Puffer zur pH-Wert Einstellung. Stark alkalische oder saure Wässer müssen jedoch vor der Analyse in einen pH-Bereich zwischen 6 und 7 gebracht werden (mit 0,5 mol/l Schwefelsäure bzw. 1 mol/l Natronlauge).

## Anmerkungen

1. EVO-Tabletten können alternativ zu der entsprechenden Standard-Tablette verwendet werden (z.B. DPD Nr. 3 EVO anstatt DPD Nr. 3).





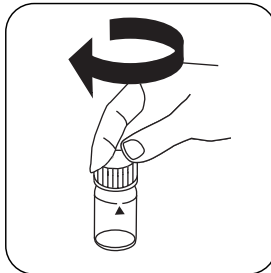
## Durchführung der Bestimmung freies Chlor mit Tablette

Die Methode im Gerät auswählen.

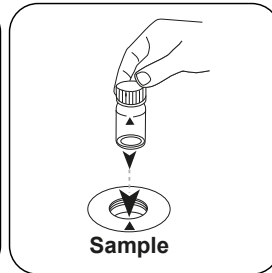
Wählen Sie zudem die Bestimmung: frei



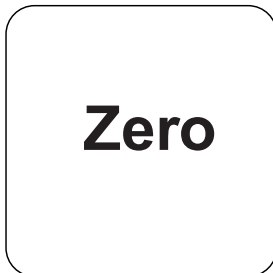
24-mm-Küvette mit **10 ml Probe** füllen.



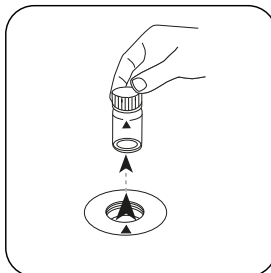
Küvette(n) verschließen.



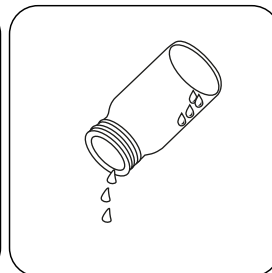
Die **Probeküvette** in den Messschacht stellen. Positionierung beachten.



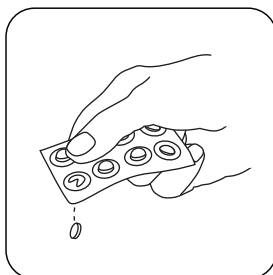
Taste **ZERO** drücken.



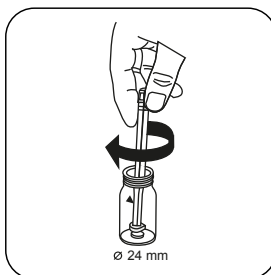
Küvette aus dem Messschacht nehmen.



Die Küvette bis auf einige Tropfen entleeren.



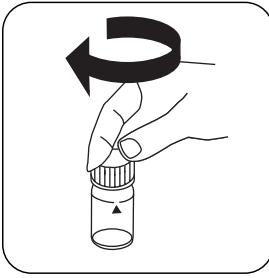
Eine **DPD No. 1 Tablette** zugeben.



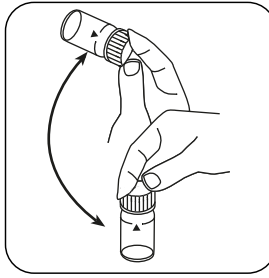
Tablette(n) unter leichter Drehung zerdrücken.



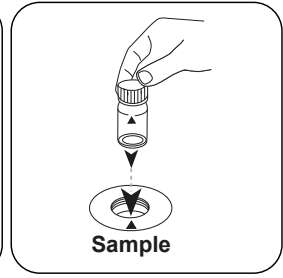
Küvette bis zur **10-ml-Marke** mit der **Probe** auffüllen.



Küvette(n) verschließen.



Tablette(n) durch Umschwenken lösen.



Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

DE

## Test

Taste **TEST** (XD: **START**) drücken.

In der Anzeige erscheint das Ergebnis in mg/l freies Chlor.

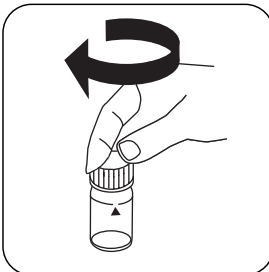
### Durchführung der Bestimmung gesamt Chlor mit Tablette

Die Methode im Gerät auswählen.

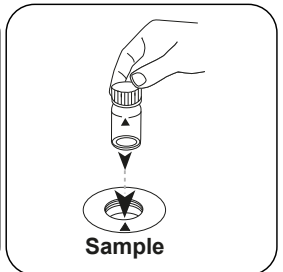
Wählen Sie zudem die Bestimmung: **gesamt**



24-mm-Küvette mit **10 ml Probe** füllen.



Küvette(n) verschließen.



Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



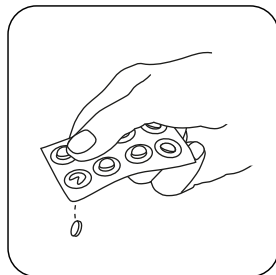
# Zero

DE

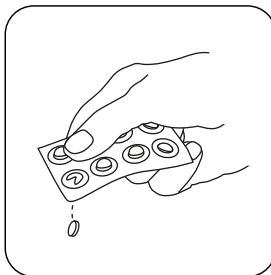
Taste **ZERO** drücken.

Küvette aus dem  
Messschacht nehmen.

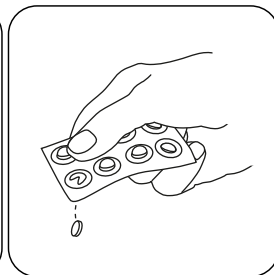
Die Küvette bis auf einige  
Tropfen entleeren.



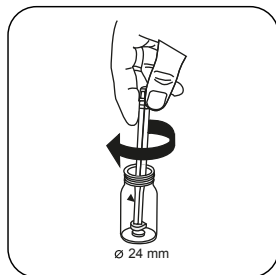
Eine **DPD No. 1** Tablette  
zugeben.



Eine **DPD No. 3** Tablette  
zugeben.



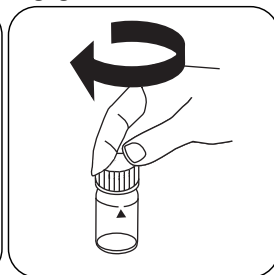
**Alternativ zur DPD Nr.  
1 und Nr. 3 Tablette kann  
eine DPD Nr. 4 Tablette  
zugegeben werden.**



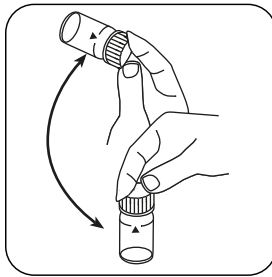
Tablette(n) unter leichter  
Drehung zerdrücken.



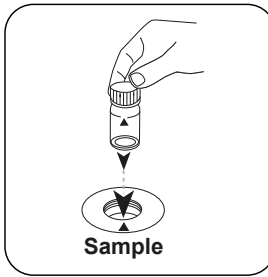
Küvette bis zur **10-ml-  
Marke** mit der **Probe**  
auffüllen.



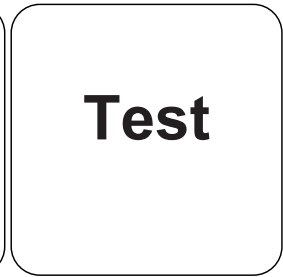
Küvette(n) verschließen.



Tablette(n) durch Umschwenken lösen.

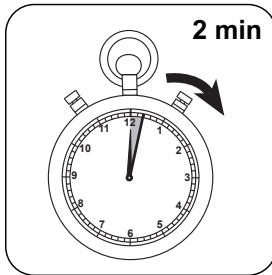


Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



Taste **TEST (XD: START)** drücken.

DE



**2 Minute(n) Reaktionszeit** abwarten.

Nach Ablauf der Reaktionszeit erfolgt automatisch die Messung. In der Anzeige erscheint das Ergebnis in mg/l Gesamtchlor.



## Chemische Methode

DPD

## Appendix

DE

### Störungen

#### Permanente Störungen

- Alle in den Proben vorhandenen Oxidationsmittel reagieren wie Chlor, was zu Mehrbefunden führt.

#### Ausschließbare Störungen

- Störungen durch Kupfer und Eisen(III) sind durch EDTA zu beseitigen.
- Bei Proben mit hohem Calciumgehalt\* und/oder hoher Leitfähigkeit\* kann es bei der Verwendung der Reagenztabletten zu einer Eintrübung der Probe und damit verbundener Fehlmessung kommen. In diesem Fall sind alternativ die Reagenztablette DPD No. 1 High Calcium und die Reagenztablette DPD No. 3 High Calcium zu verwenden.  
\*exakte Werte können nicht angegeben werden, da die Entstehung einer Trübung von Art und Zusammensetzung des Probenwassers abhängt.
- Konzentrationen über 10 mg/L Chlor, bei Verwendung von Tabletten, können zu Ergebnissen innerhalb des Messbereichs bis hin zu 0 mg/L führen. Bei einer zu hohen Chlorkonzentration muss die Probe mit chlorfremem Wasser verdünnt werden. 10 ml der verdünnten Probe werden mit Reagenz versetzt und die Messung wiederholt (Plausibilitätstest).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0.01
$\text{MnO}_2$	0.01

### Methodenvalidierung

<b>Nachweisgrenze</b>	0.02 mg/L
<b>Bestimmungsgrenze</b>	0.06 mg/L
<b>Messbereichsende</b>	6 mg/L
<b>Empfindlichkeit</b>	2.05 mg/L / Abs
<b>Vertrauensbereich</b>	0.04 mg/L
<b>Verfahrensstandardabweichung</b>	0.019 mg/L
<b>Verfahrensvariationskoeffizient</b>	0.87 %



**Konform**

EN ISO 7393-2

<sup>a)</sup> Bestimmung von frei, gebunden, gesamt möglich | <sup>a)</sup> Hilfsreagenz, alternativ zur DPD No. 1 / No. 3 bei Eintrübungen der Probe durch hohen Calciumionengehalt und/oder hohe Leitfähigkeit

DE

**Chlor L****M101****0,02 - 4,0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD****Material**

DE

Benötigtes Material (zum Teil optional):

<b>Titel</b>	<b>Verpackungseinheit</b>	<b>Bestell-Nr.</b>
DPD 1 Pufferlösung, blaue Flasche	15 mL	471010
DPD 1 Pufferlösung	100 mL	471011
DPD 1 Pufferlösung im 6-er Pack	1 St.	471016
DPD 1 Reagenzlösung, grüne Flasche	15 mL	471020
DPD 1 Reagenzlösung	100 mL	471021
DPD 1 Reagenzlösung im 6-er Pack	1 St.	471026
DPD 3 Lösung, rote Flasche	15 mL	471030
DPD 3 Lösung	100 mL	471031
DPD 3 Lösung im 6-er Pack	1 St.	471036
DPD Reagenzien Set	1 St.	471056

**Verfügbare Standards**

<b>Titel</b>	<b>Verpackungseinheit</b>	<b>Bestell-Nr.</b>
ValidCheck Chlor 1,5 mg/l	1 St.	48105510

**Probenahme**

1. Bei der Probenvorbereitung muss das Ausgasen von Chlor, z.B. durch Pipettieren und Schütteln, vermieden werden.
2. Die Analyse muss unmittelbar nach der Probenahme erfolgen.

## Vorbereitung

1. Reinigung der Küvetten:  
Da viele Haushaltsreiniger (z.B. Geschirrspülmittel) reduzierende Stoffe enthalten, kann es bei der Bestimmung von Chlor zu Minderbefunden kommen. Um diesen Messfehler auszuschließen, sollten die Glasgeräte chlorzehrungsfrei sein. Dazu werden die Glasgeräte für eine Stunde unter Natriumhypochloritlösung (0,1 g/L) aufbewahrt und danach gründlich mit VE-Wasser (Vollentsalztes Wasser) gespült.
2. Für die Einzelbestimmung von freiem Chlor und Gesamtchlor ist es sinnvoll, jeweils einen eigenen Satz Küvetten zu verwenden (siehe EN ISO 7393-2, Abs. 5.3).
3. Die DPD-Farmentwicklung erfolgt bei einem pH-Wert von 6,2 bis 6,5. Die Reagenzien enthalten daher einen Puffer zur pH-Wert Einstellung. Stark alkalische oder saure Wässer müssen jedoch vor der Analyse in einen pH-Bereich zwischen 6 und 7 gebracht werden (mit 0,5 mol/l Schwefelsäure bzw. 1 mol/l Natronlauge).

## Anmerkungen

1. Nach Gebrauch sind die Tropfflaschen mit der jeweils gleichfarbigen Schraubkappe sofort wieder zu verschließen.
2. Den Reagenziensatz bei +6 °C bis +10 °C kühl lagern.





## Durchführung der Bestimmung freies Chlor mit Flüssigreagenz

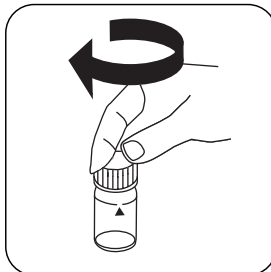
Die Methode im Gerät auswählen.

Wählen Sie zudem die Bestimmung: frei

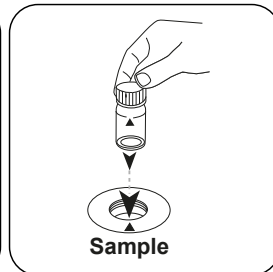
DE



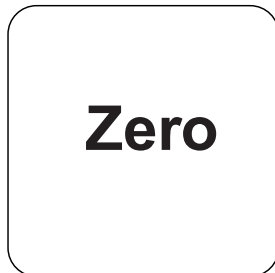
24-mm-Küvette mit **10 ml Probe** füllen.



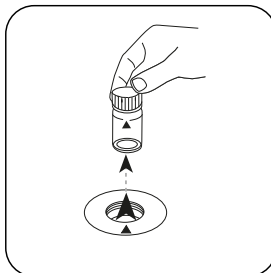
Küvette(n) verschließen.



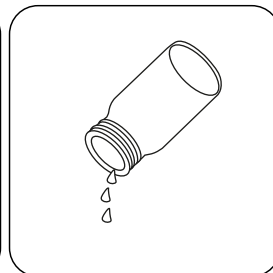
Die **Probeküvette** in den Messschacht stellen. Positionierung beachten.



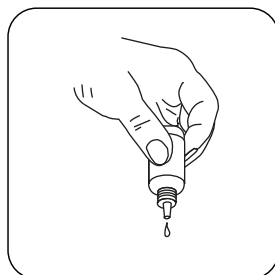
Taste **ZERO** drücken.



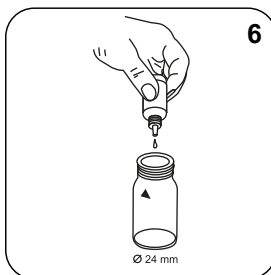
Küvette aus dem Messschacht nehmen.



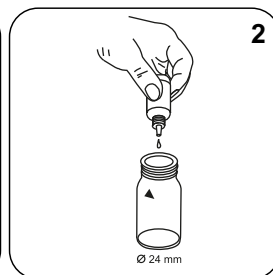
Küvette entleeren.



Die Tropfflaschen senkrecht halten und durch langsames Drücken gleich große Tropfen zugeben.



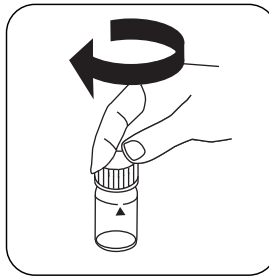
**6 Tropfen DPD**  
**1 Puffer-Lösung** zugeben.



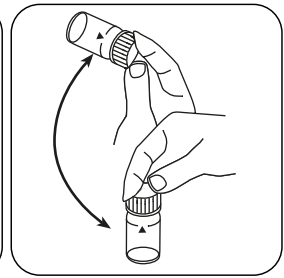
**2 Tropfen DPD**  
**1 Reagenz-Lösung** zugeben.



Küvette bis zur **10-ml-Marke** mit der **Probe** auffüllen.

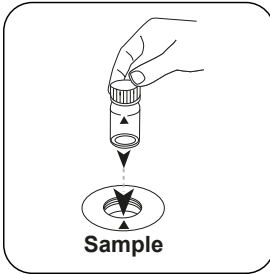


Küvette(n) verschließen.

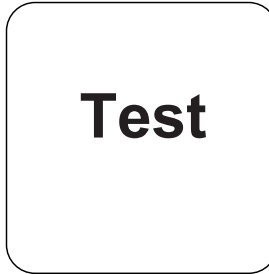


Inhalt durch Umschwenken mischen.

DE



Die **Probeküvette** in den Messschacht stellen. Positionierung beachten. In der Anzeige erscheint das Ergebnis in mg/l freies Chlor.



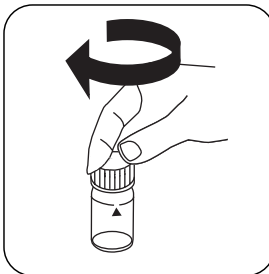
Taste **TEST** (XD: **START**) drücken.

## Durchführung der Bestimmung gesamtes Chlor mit Flüssigreagenz

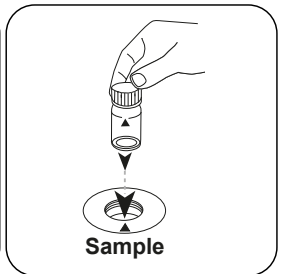
Die Methode im Gerät auswählen. Wählen Sie zudem die Bestimmung: gesamt



24-mm-Küvette mit **10 ml Probe** füllen.



Küvette(n) verschließen.

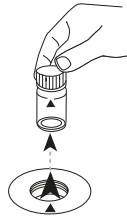


Die **Probeküvette** in den Messschacht stellen. Positionierung beachten.

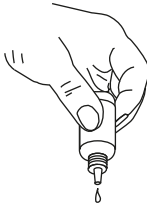
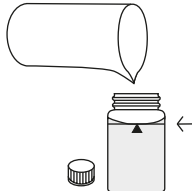
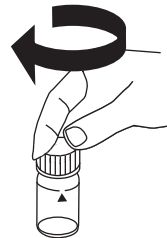


# Zero

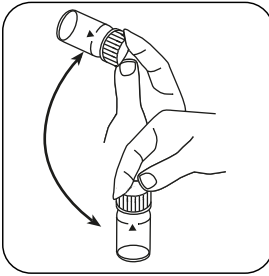
DE

Taste **ZERO** drücken.Küvette aus dem  
Messschacht nehmen.

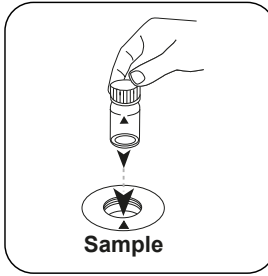
Küvette entleeren.

Die Tropfflaschen  
senkrecht halten und durch  
langsameres Drücken gleich  
große Tropfen zugeben.**6****6 Tropfen DPD**  
**1 Puffer-Lösung**  
zugeben.**2****2 Tropfen DPD**  
**1 Reagenz-Lösung**  
zugeben.**3****3 Tropfen DPD 3 Lösung**  
zugeben.Küvette bis zur **10-ml-**  
**Marke** mit der **Probe**  
auffüllen.

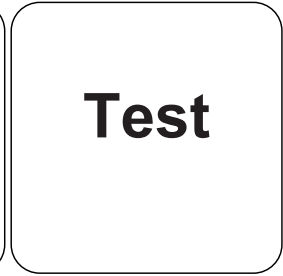
Küvette(n) verschließen.



Inhalt durch Umschwenken mischen.

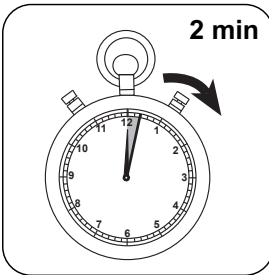


Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



Taste **TEST** (XD: **START**) drücken.

DE



**2 Minute(n) Reaktionszeit** abwarten.

Nach Ablauf der Reaktionszeit erfolgt automatisch die Messung. In der Anzeige erscheint das Ergebnis in mg/l Gesamtchlor.



## Chemische Methode

DPD

## Appendix

DE

### Störungen

#### Permanente Störungen

- Alle in den Proben vorhandenen Oxidationsmittel reagieren wie Chlor, was zu Mehrbefunden führt.

#### Ausschließbare Störungen

- Störungen durch Kupfer und Eisen(III) sind durch EDTA zu beseitigen.
- Konzentrationen über 4 mg/L Chlor, bei Verwendung von Flüssigreagenzien, können zu Ergebnissen innerhalb des Messbereichs bis hin zu 0 mg/L führen. In diesem Fall muss die Probe mit chlorfreiem Wasser verdünnt werden. 10 ml der verdünnten Probe werden mit Reagenz versetzt und die Messung wiederholt (Plausibilitätstest).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0,01
$\text{MnO}_2$	0,01

#### Konform

EN ISO 7393-2

<sup>a)</sup> Bestimmung von frei, gebunden, gesamt möglich





pH-Wert T

M330

6,5 - 8,4 pH

PH

Phenolrot

## Material

DE

Benötigtes Material (zum Teil optional):

Titel	VerpackungseinheitBestell-Nr.	
Phenol Red Photometer	Tablette / 100	511770BT
Phenol Red Photometer	Tablette / 250	511771BT
Phenol Red Photometer	Tablette / 500	511772BT

## Anmerkungen

1. Für die photometrische pH-Wert Bestimmung sind nur PHENOL RED-Tabletten mit schwarzem Foliendruck zu verwenden, die mit dem Begriff PHOTOMETER gekennzeichnet sind.

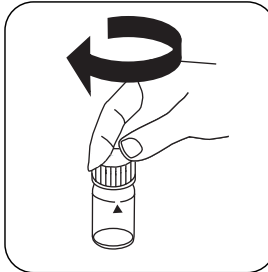


## Durchführung der Bestimmung pH-Wert mit Tablette

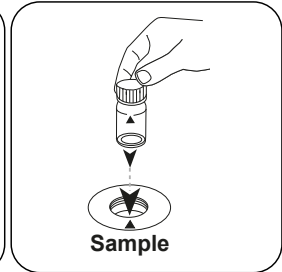
Die Methode im Gerät auswählen.



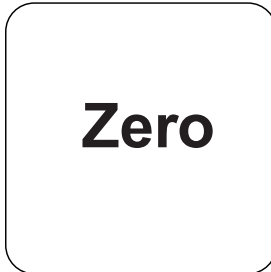
24-mm-Küvette mit **10 ml Probe** füllen.



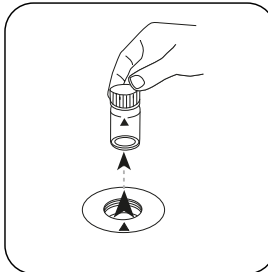
Küvette(n) verschließen.



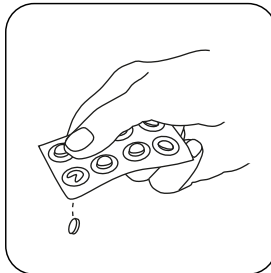
Die **Probeküvette** in den Messschacht stellen. Positionierung beachten.



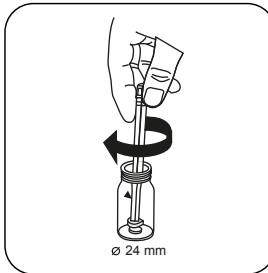
Taste **ZERO** drücken.



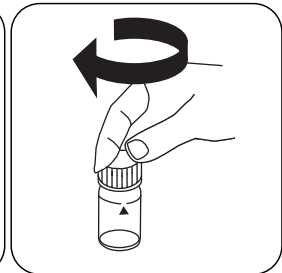
Küvette aus dem Messschacht nehmen.



Eine **PHENOL RED PHOTOMETER** Tablette zugeben.



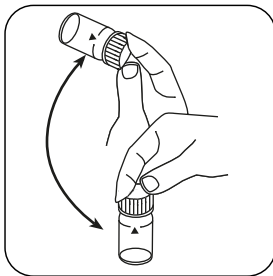
Tablette(n) unter leichter Drehung zerdrücken.



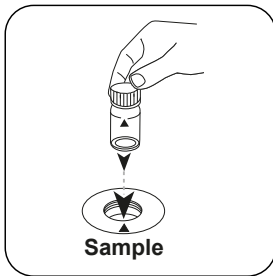
Küvette(n) verschließen.

DE

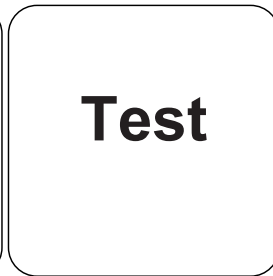




Tablette(n) durch Umschwenken lösen.



Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



Taste **TEST** (XD: **START**) drücken.

In der Anzeige erscheint das Ergebnis als pH-Wert.

DE

## Chemische Methode

Phenolrot

## Appendix

### Störungen

DE

#### Permanente Störungen

1. Wasserproben mit geringer Carbonathärte\* können falsche pH-Werte ergeben.  
\* $K_{\text{S4,3}} < 0,7 \text{ mmol/l} \hat{=} \text{Gesamthärte} < 35 \text{ mg/L CaCO}_3$ .

#### Ausschließbare Störungen

1. pH-Werte unter 6,5 und über 8,4 können zu Ergebnissen innerhalb des Messbereiches führen. Es wird ein Plausibilitätstest (pH-Meter) empfohlen.
2. Salzfehler:  
Bei Salzgehalten bis 2 g/L ist kein nennenswerter Salzfehler aufgrund des Salzgehaltes der Reagenztablette zu erwarten. Bei höheren Salzgehalten sind die Messwerte wie folgt zu korrigieren:

Salzgehalt der Probe in g/L	30 (Meerwasser)	60	120	180
Korrektur	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup>nach Kolthoff (1922)

<sup>2)</sup>nach Parson und Douglas (1926)

#### Literaturverweise

Colorimetric Chemical Analytical Methods, 9th Edition, London



pH-Wert L

M331

6,5 - 8,4 pH

PH

Phenolrot

DE

## Material

Benötigtes Material (zum Teil optional):

Titel	VerpackungseinheitBestell-Nr.	
Phenolrot Lösung	15 mL	471040
Phenolrot Lösung	100 mL	471041
Phenolrot Lösung im -6er Pack	1 St.	471046

## Vorbereitung

1. Auf Grund unterschiedlicher Tropfengröße kann das Messergebnis größere Abweichungen als bei Verwendung von Tabletten aufweisen.  
Bei Verwendung einer Pipette (0,18 ml entsprechen 6 Tropfen) kann diese Abweichung minimiert werden.

## Anmerkungen

1. Nach Gebrauch ist die Trofflasche mit der gleichfarbigen Schraubkappe sofort wieder zu verschließen.
2. Das Reagenz bei +6 °C bis +10 °C kühl lagern.

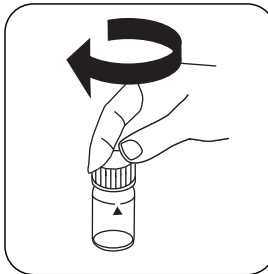


## Durchführung der Bestimmung pH-Wert mit Flüssigreagenz

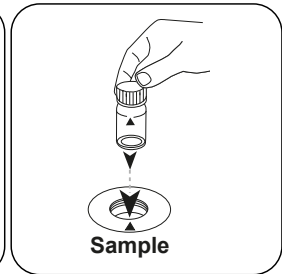
Die Methode im Gerät auswählen.



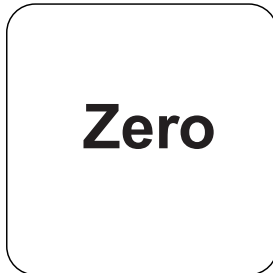
24-mm-Küvette mit **10 ml Probe** füllen.



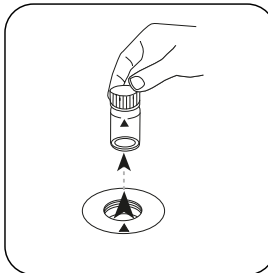
Küvette(n) verschließen.



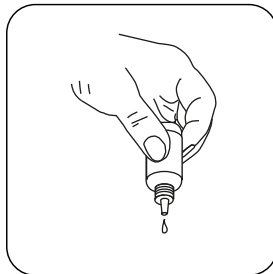
Die **Probeküvette** in den Messschacht stellen. Positionierung beachten.



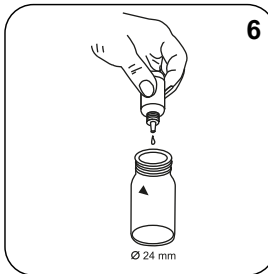
Taste **ZERO** drücken.



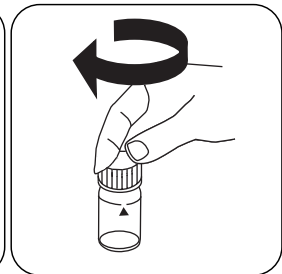
Küvette aus dem Messschacht nehmen.



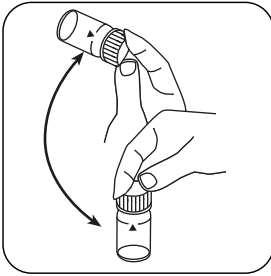
Die Tropfflaschen senkrecht halten und durch langsames Drücken gleich große Tropfen zugeben.



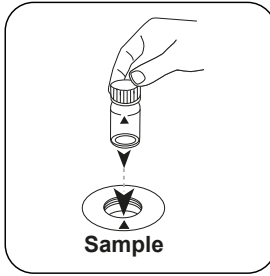
**6 Tropfen PHENOL Red-Lösung** zugeben.



Küvette(n) verschließen.

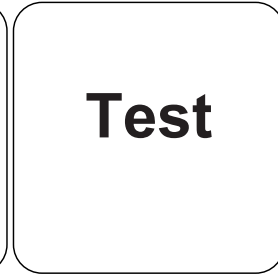


Inhalt durch Umschwenken  
mischen.



Die **Probenküvette** in  
den Messschacht stellen.  
Positionierung beachten.

In der Anzeige erscheint das  
Ergebnis als pH-Wert.



Taste **TEST** (XD: **START**)  
drücken.

DE

## Chemische Methode

Phenolrot

## Appendix

### Störungen

DE

#### Ausschließbare Störungen

1. Salzfehler: Korrektur des Messwertes (durchschnittliche Werte) für Proben mit einem Salzgehalt von:


Salzgehalt der Probe	Korrektur
30 g/L (Meerwasser)	-0,15 <sup>1)</sup>
60 g/L	-0,21 <sup>2)</sup>
120 g/L	-0,26 <sup>2)</sup>
180 g/L	-0,29 <sup>2)</sup>
<sup>1)</sup> nach Kolthoff (1922)	<sup>2)</sup> nach Parson und Douglas (1926)

3. Bei der Untersuchung von gechlortem Wasser kann der vorhandene Restchlorgehalt die Farbreaktion des Flüssigreagenzes beeinflussen. Dies wird verhindert, indem ein kleiner Kristall Natriumthiosulfat ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) in die Probelösung gegeben wird, bevor die PHENOL RED-Lösung zugesetzt wird.

#### Literaturverweise

Colorimetric Chemical Analytical Methods, 9th Edition, London

KS4.3 T / 20



**Nombre del método**

**Número de método**

**Código de barras para reconocer el método**

**Rango de medición**

$K_{S4.3} T$   
0.1 - 4 mmol/l  $K_{S4.3}$

20  
S:4.3

**Método químico**

Ácido / Indicador

**Indicación en la pantalla de MD 100 / MD 110 / MD 200**

**Información específica del instrumento**

La prueba puede realizarse en los siguientes dispositivos. Además, se muestran la cubeta requerida y el rango de absorción del fotómetro.

Dispositivos	Cubeta	$\lambda$	Rango de medición
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	$\varnothing$ 24 mm	610 nm	0.1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	$\varnothing$ 24 mm	615 nm	0.1 - 4 mmol/l $K_{S4.3}$

**Material**

Material requerido (parcialmente opcional):

Título	Unidad de embalaje	Referencia No
Fotómetro alca-M	Tabletas / 100	513210BT
Fotómetro alca-M	Tabletas / 250	513211BT

**Lista de aplicaciones**

- Tratamiento de aguas residuales
- Tratamiento de aguas potables
- Tratamiento de aguas de aporte

**Notas**

1. Las definiciones de alcalinidad-m, valor-m y capacidad ácida  $K_{S4.3}$  son idénticas.
2. Añadir un volumen de muestra de exactamente 10 ml, ya que este volumen influye de forma decisiva en la exactitud del resultado.

**Códigos de idioma ISO 639-1**

**Estado de revisión**

ES Manual de Métodos 01/20

Realización de la  
determinación

**Ejecución de la determinación Capacidad ácida  $K_{a4.3}$  con tableta**

Seleccionar el método en el aparato.

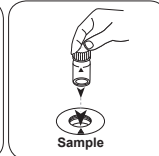
Para este método no es necesario realizar medición CERO en los aparatos siguientes:  
XD 7000, XD 7500



Llenar la cubeta de 24 mm con **10 ml de muestra**.

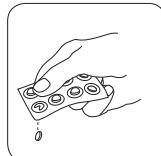


Cerrar la(s) cubeta(s).

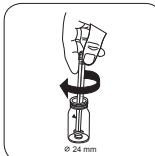


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

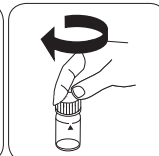
• • •



Añadir **tableta ALKA-M-PHOTOMETER**.



Triturar la(s) tableta(s) girando ligeramente.



Cerrar la(s) cubeta(s).





Cloro T

M100

0.01 - 6.0 mg/L Cl<sub>2</sub> <sup>a)</sup>

CL6

DPD

## Material

ES

Material requerido (parcialmente opcional):

Título	Verpackungseinheit	Referencia No
DPD n° 1	Tabletas / 100	511050BT
DPD n° 1	Tabletas / 250	511051BT
DPD n° 1	Tabletas / 500	511052BT
DPD n° 3	Tabletas / 100	511080BT
DPD n° 3	Tabletas / 250	511081BT
DPD n° 3	Tabletas / 500	511082BT
DPD n° 1 High Calcium <sup>e)</sup>	Tabletas / 100	515740BT
DPD n° 1 High Calcium <sup>e)</sup>	Tabletas / 250	515741BT
DPD n° 1 High Calcium <sup>e)</sup>	Tabletas / 500	515742BT
DPD n° 3 High Calcium <sup>e)</sup>	Tabletas / 100	515730BT
DPD n° 3 High Calcium <sup>e)</sup>	Tabletas / 250	515731BT
DPD n° 3 High Calcium <sup>e)</sup>	Tabletas / 500	515732BT
DPD n° 4	Tabletas / 100	511220BT
DPD n° 4	Tabletas / 250	511221BT
DPD n° 4	Tabletas / 500	511222BT
DPD n° 3 EVO	Tabletas / 100	511420BT
DPD n° 3 EVO	Tabletas / 250	511421BT
DPD n° 3 EVO	Tabletas / 500	511422BT
DPD n° 4 EVO	Tabletas / 100	511970BT
DPD n° 4 EVO	Tabletas / 250	511971BT
DPD n° 4 EVO	Tabletas / 500	511972BT
Recambio Scuba II	1 Cantidad	525600

## Standards disponibles

Title	Verpackungseinheit	Referencia No
ValidCheck cloro 1,5 mg/l	1 Cantidad	48105510

## Muestreo

1. Evitar durante la preparación de la muestra la desgasificación de cloro, p. ej., al pipetar o agitar.
2. La determinación se ha de realizar inmediatamente después de la toma de la muestra.

## Preparación

1. Limpieza de las cubetas:  
Muchos productos de limpieza (p. ej., detergentes de lavavajillas) poseen componentes reductores, que pueden reducir los resultados en la determinación del cloro. Para evitar estas alteraciones, los aparatos de vidrio deben estar exentos de componentes corrosivos al cloro. Para ello, deberá sumergir los aparatos de vidrio durante una hora en una solución de hipoclorito sódico (0,1 g/L), enjuagándolos minuciosamente a continuación con agua desionizada.
2. Para la determinación individual de cloro libre y cloro total se recomienda utilizar siempre los mismos sets de cubetas respectivamente (véase EN ISO 7393-2, párrafo 5.3).
3. El desarrollo coloreo por DPD se efectúa entre un valor de pH de 6,2 - 6,5. Por ello poseen las tabletas un tampón para la graduación del valor de pH. Sin embargo, las muestras acuosas muy ácidas o muy básicas se deberán neutralizar a un valor de pH entre 6 y 7 antes de realizar el análisis (con 0,5 mol/l de ácido sulfúrico o 1 mol/l de hidróxido sódico).

## Notas

1. Las tabletas EVO pueden utilizarse como alternativa a la tableta estándar correspondiente (por ejemplo, DPD nº 3 EVO en lugar de DPD nº 3).



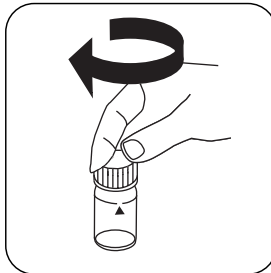
## Ejecución de la determinación Cloro libre con tableta

Seleccionar el método en el aparato.

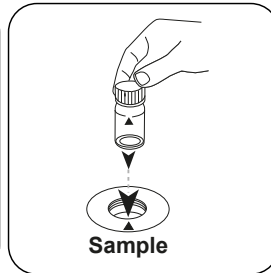
Seleccione además la determinación: libre



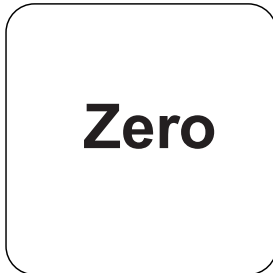
Llenar la cubeta de 24 mm con **10 ml de muestra** .



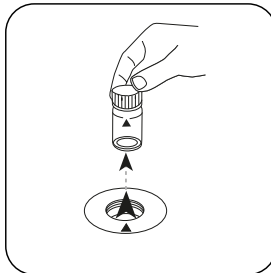
Cerrar la(s) cubeta(s).



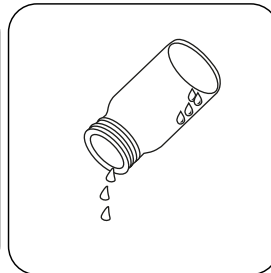
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



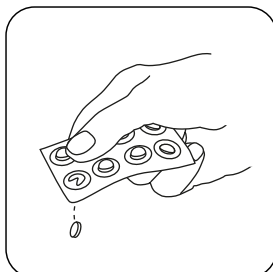
Pulsar la tecla **ZERO**.



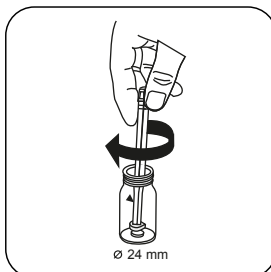
Extraer la cubeta del compartimiento de medición.



Vaciar la cubeta excepto algunas gotas.



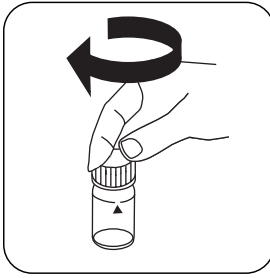
Añadir **tableta DPD No. 1**.



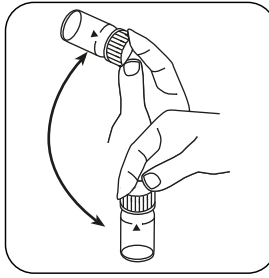
Triturar la(s) tableta(s) girando ligeramente.



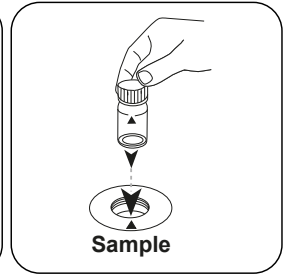
Llenar la cubeta con la **muestra** hasta la **marca de 10 ml** .



Cerrar la(s) cubeta(s).



Disolver la(s) tableta(s) girando.



Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

ES

## Test

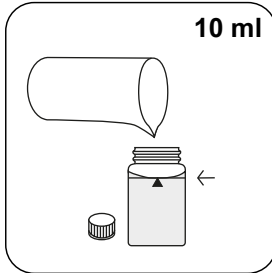
Pulsar la tecla **TEST** (XD: **START**).

A continuación se visualizará el resultado en mg/l Cloro libre.

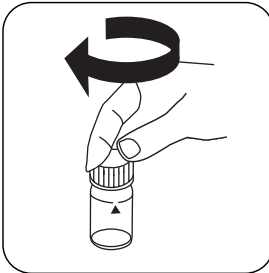
### Ejecución de la determinación Cloro total con tableta

Seleccionar el método en el aparato.

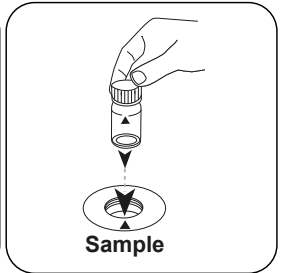
Seleccione además la determinación: total



Llenar la cubeta de 24 mm con **10 ml de muestra**.



Cerrar la(s) cubeta(s).

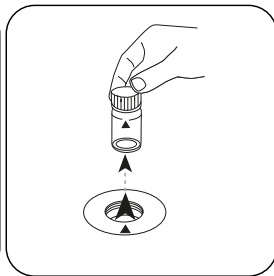


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

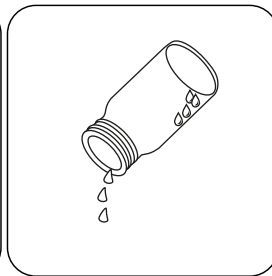


# Zero

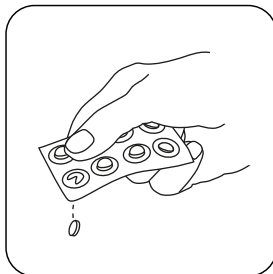
Pulsar la tecla **ZERO**.



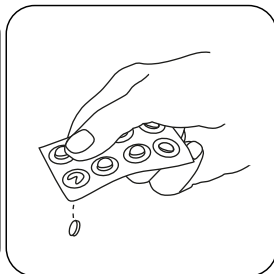
Extraer la cubeta del compartimiento de medición.



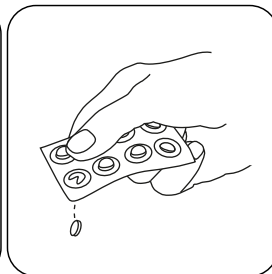
Vaciar la cubeta excepto algunas gotas.



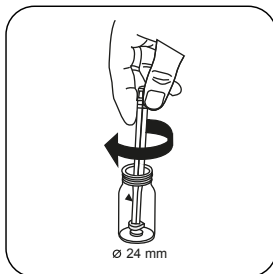
Añadir **tableta DPD No. 1**.



Añadir **tableta DPD No. 3**.



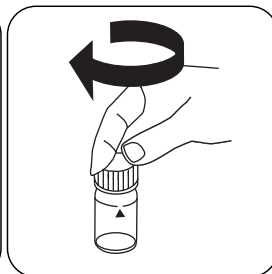
**Alternativa a la tableta DPD No 1 y No 3, se puede agregar una tableta DPD No. 4.**



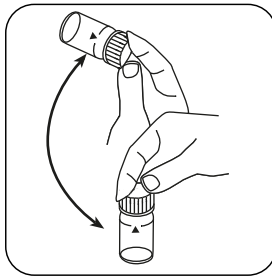
Triturar la(s) tableta(s) girando ligeramente.



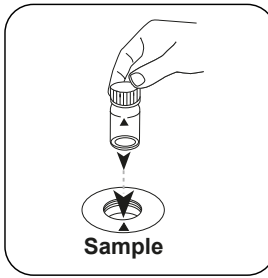
Llenar la cubeta con la **muestra** hasta la **marca de 10 ml**.



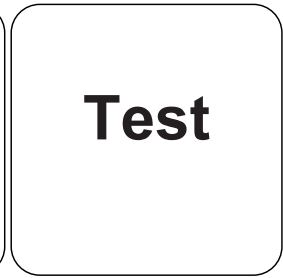
Cerrar la(s) cubeta(s).



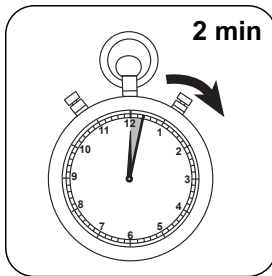
Disolver la(s) tableta(s) girando.



Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



Pulsar la tecla **TEST** (XD: **START**).



Esperar **2 minutos como periodo de reacción**.

Finalizado el periodo de reacción se realizará la determinación automáticamente. A continuación se visualizará el resultado en mg/l Cloro total.



## Método químico

DPD

## Apéndice

ES

### Interferencia

#### Interferencias persistentes

- Todos los elementos oxidantes existentes en la muestra reaccionan como el cloro, lo que produce un resultado más elevado.

#### Interferencias extraíbles

- Las perturbaciones debido a cobre y hierro (III) deben suprimirse mediante EDTA.
- En las muestras con una elevada concentración de iones de calcio\* y/o alta conductividad\*, se puede producir un enturbiamiento de la muestra con el uso de las tabletas de reactivo, alterando el resultado. En este caso, utilizar alternativamente la tableta reactiva DPD n° 1 High Calcium y la tableta reactiva DPD n° 3 High Calcium. \*no se pueden dar valores exactos, ya que la aparición de enturbiamiento dependerá del tipo y composición de la muestra.
- Las concentraciones de cloro mayores a 10 mg/L, cuando se usan tabletas pueden conducir a resultados de dentro del campo de medición hasta 0 mg/L. Con una concentración de cloro alta, se deberá diluir la muestra con agua sin cloro. Se mezclan 10 ml de muestra diluida con reactivo y se repite la medición (prueba de plausibilidad).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

### Validación del método

Límite de detección	0.02 mg/L
Límite de determinación	0.06 mg/L
Límite del rango de medición	6 mg/L
Sensibilidad	2.05 mg/L / Abs
Intervalo de confianza	0.04 mg/L
Desviación estándar	0.019 mg/L
Coefficiente de variación	0.87 %

Conforme a

EN ISO 7393-2



<sup>a)</sup> Posible determinación de libre, combinado, total | <sup>a)</sup> Reactivo auxiliar, alternativo a DPD No.1/3 en enturbiamientos de la prueba debido a concentraciones elevadas de calcio y/o elevada conductividad

ES





Cloro L

M101

0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>

CL6

DPD

ES

## Material

Material requerido (parcialmente opcional):

Título	Verpackungseinheit	Referencia No
Solución de tampón DPD 1, frasco azul	15 mL	471010
Solución de tampón DPD 1	100 mL	471011
Solución de tampón DPD 1 en pack de 6	1 Cantidad	471016
Solución reactiva DPD 1, frasco verde	15 mL	471020
Solución de reactivo DPD 1	100 mL	471021
Solución reactiva DPD 1 en pack de 6	1 Cantidad	471026
Solución DPD 3, frasco rojo	15 mL	471030
Solución DPD 3	100 mL	471031
Solución DPD 3 en pack de 6	1 Cantidad	471036
Juego de reactivos para DPD	1 Cantidad	471056

## Standards disponibles

Title	Verpackungseinheit	Referencia No
ValidCheck cloro 1,5 mg/l	1 Cantidad	48105510

## Muestreo

1. Evitar durante la preparación de la muestra la desgasificación de cloro, p. ej., al pipetar o agitar.
2. La determinación se ha de realizar inmediatamente después de la toma de la muestra.

## Preparación

1. Limpieza de las cubetas:  
Muchos productos de limpieza (p. ej., detergentes de lavavajillas) poseen componentes reductores, que pueden reducir los resultados en la determinación del cloro. Para evitar estas alteraciones, los aparatos de vidrio deben estar exentos de componentes corrosivos al cloro. Para ello, deberá sumergir los aparatos de vidrio durante una hora en una solución de hipoclorito sódico (0,1 g/L), enjuagándolos minuciosamente a continuación con agua desionizada.
2. Para la determinación individual de cloro libre y cloro total se recomienda utilizar siempre los mismos sets de cubetas respectivamente (véase EN ISO 7393-2, párrafo 5.3).
3. El desarrollo coloreo por DPD se efectúa entre un valor de pH de 6,2 - 6,5. Por ello poseen las tabletas un tampón para la graduación del valor de pH. Sin embargo, las muestras acuosas muy ácidas o muy básicas se deberán neutralizar a un valor de pH entre 6 y 7 antes de realizar el análisis (con 0,5 mol/l de ácido sulfúrico o 1 mol/l de hidróxido sódico).

## Notas

1. Después de usarlas, las botellas cuentagotas deben cerrarse de nuevo inmediatamente con la tapa roscada del mismo color, respectivamente.
2. Guardar el set reactivo a una temperatura entre +6 °C y +10 °C.



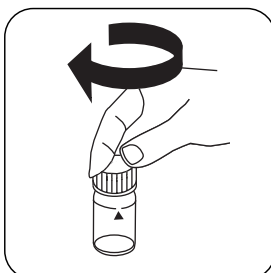
## Ejecución de la determinación Cloro libre con reactivos líquidos

Seleccionar el método en el aparato.

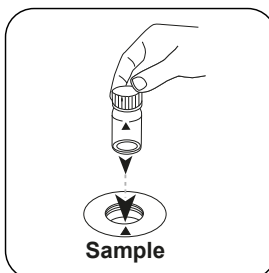
Seleccione además la determinación: libre



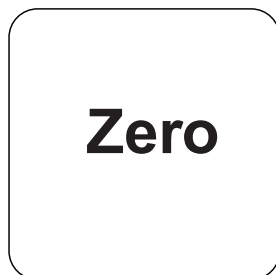
Llenar la cubeta de 24 mm con **10 ml de muestra** .



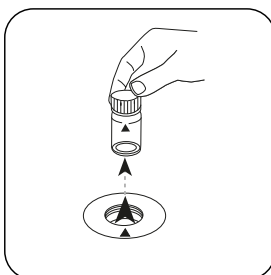
Cerrar la(s) cubeta(s).



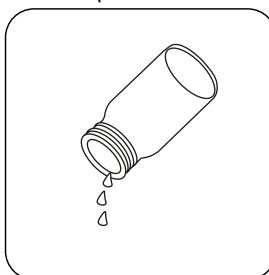
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



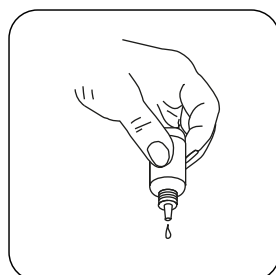
Pulsar la tecla **ZERO**.



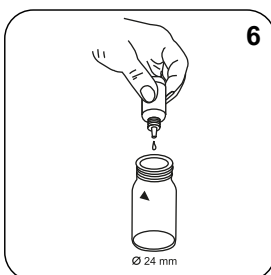
Extraer la cubeta del compartimiento de medición.



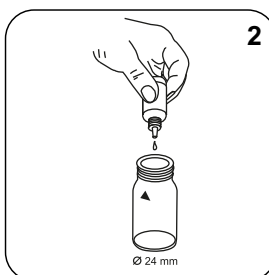
Vaciar la cubeta.



Mantener la botella cuentagotas vertical y añadir gotas del mismo tamaño presionando lentamente.



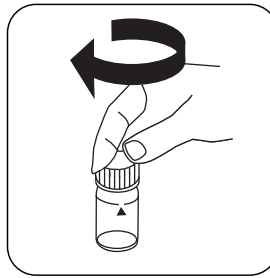
Añadir **6 gotas de DPD 1 Buffer Solution**.



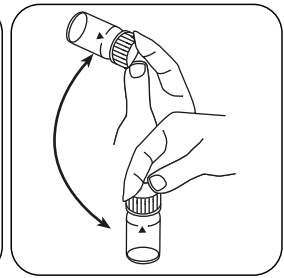
Añadir **2 gotas de DPD 1 Reagent Solution**.



Llenar la cubeta con la **muestra** hasta la **marca de 10 ml** .

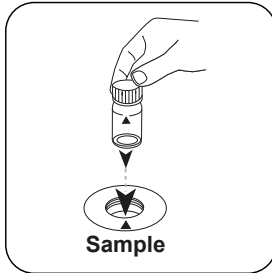


Cerrar la(s) cubeta(s).

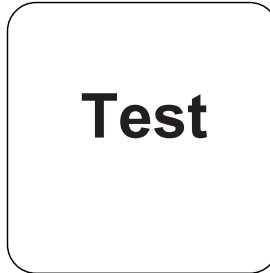


Mezclar el contenido girando.

ES



Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



Pulsar la tecla **TEST** (XD: **START**).

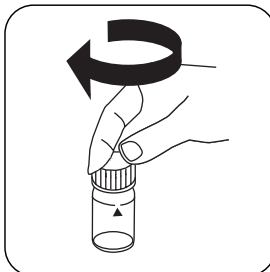
A continuación se visualizará el resultado en mg/l Cloro libre.

## Ejecución de la determinación Cloro total con reactivos líquidos

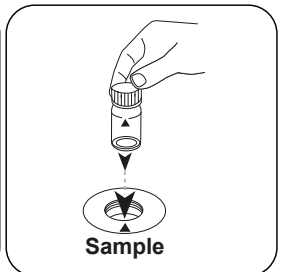
Seleccionar el método en el aparato.  
 Seleccione además la determinación: total



Llenar la cubeta de 24 mm con **10 ml de muestra** .



Cerrar la(s) cubeta(s).

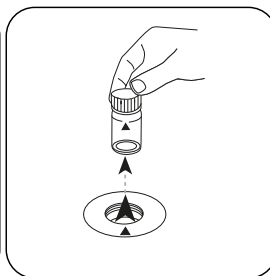


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

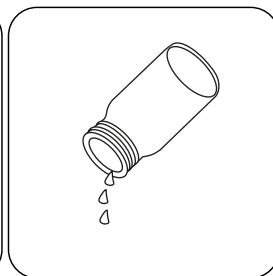


# Zero

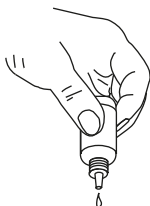
Pulsar la tecla **ZERO**.



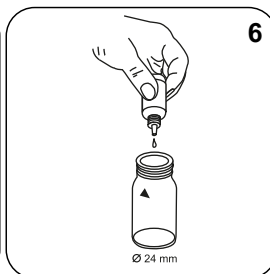
Extraer la cubeta del compartimiento de medición.



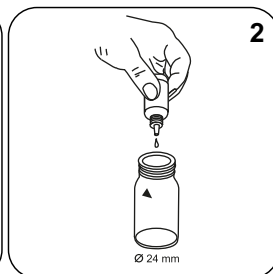
Vaciar la cubeta.



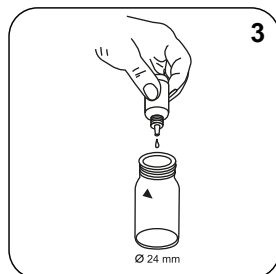
Mantener la botella cuentagotas vertical y añadir gotas del mismo tamaño presionando lentamente.



Añadir **6 gotas de DPD 1 Buffer Solution**.



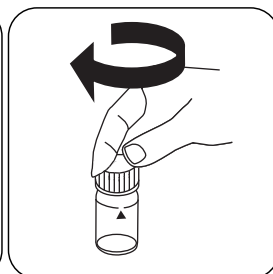
Añadir **2 gotas de DPD 1 Reagent Solution**.



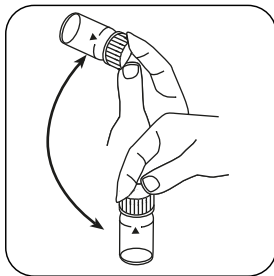
Añadir **3 gotas de DPD 3 Solution**.



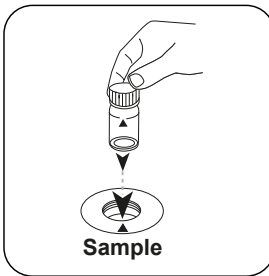
Llenar la cubeta con la muestra hasta la marca de **10 ml**.



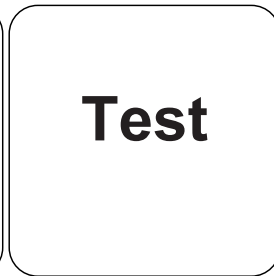
Cerrar la(s) cubeta(s).



Mezclar el contenido girando.

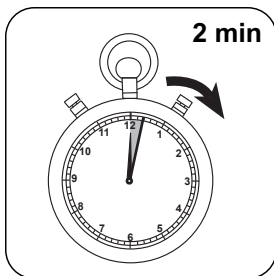


Poner la  **cubeta de muestra**  en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



Pulsar la tecla **TEST (XD: START)**.

ES



Esperar  **2 minutos como periodo de reacción** .

Finalizado el periodo de reacción se realizará la determinación automáticamente. A continuación se visualizará el resultado en mg/l Cloro total.



## Método químico

DPD

## Apéndice

ES

### Interferencia

#### Interferencias persistentes

- Todos los elementos oxidantes existentes en la muestra reaccionan como el cloro, lo que produce un resultado más elevado.

#### Interferencias extraíbles

- Las perturbaciones debido a cobre y hierro (III) deben suprimirse mediante EDTA.
- Las concentraciones de cloro mayores a 4 mg/L, cuando se usan reactivos líquidos pueden conducir a resultados de dentro del campo de medición hasta 0 mg/L. En este caso, se deberá diluir la muestra con agua sin cloro. Se mezclan 10 ml de muestra diluida con reactivo y se repite la medición (prueba de plausibilidad).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0,01
$\text{MnO}_2$	0,01

#### Conforme a

EN ISO 7393-2

<sup>\*)</sup> Posible determinación de libre, combinado, total







Valor de pH T

M330

6.5 - 8.4 pH

PH

Rojo de fenol

ES

## Material

Material requerido (parcialmente opcional):

Título	Verpackungseinheit	Referencia No
Rojo de fenol fotómetro	Tabletas / 100	511770BT
Rojo de fenol fotómetro	Tabletas / 250	511771BT
Rojo de fenol fotómetro	Tabletas / 500	511772BT

## Notas

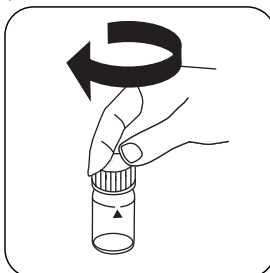
1. Para la determinación fotométrica del valor de pH solo deben usarse tabletas PHENOL RED selladas en una lámina negra con la palabra adicional PHOTOMETER.

## Ejecución de la determinación Valor de pH con tableta

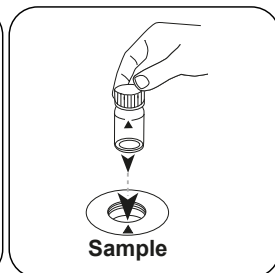
Seleccionar el método en el aparato.



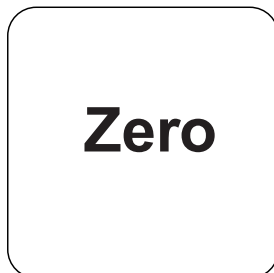
Llenar la cubeta de 24 mm con **10 ml de muestra** .



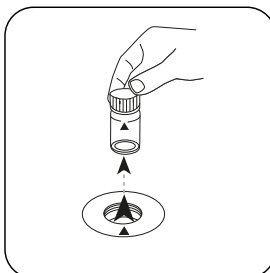
Cerrar la(s) cubeta(s).



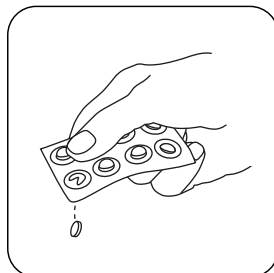
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



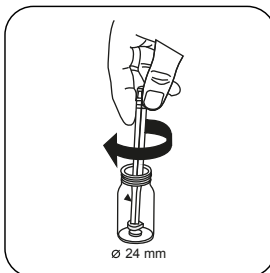
Pulsar la tecla **ZERO**.



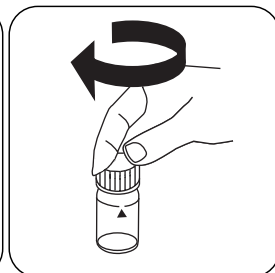
Extraer la cubeta del compartimiento de medición.



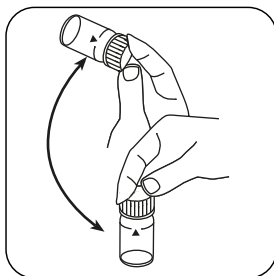
Añadir **tableta PHENOL RED PHOTOMETER**.



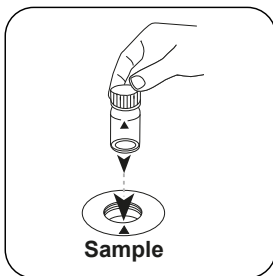
Triturar la(s) tableta(s) girando ligeramente.



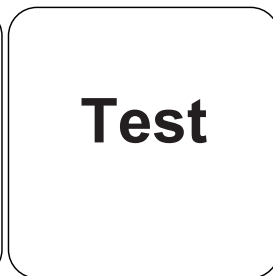
Cerrar la(s) cubeta(s).



Disolver la(s) tableta(s) girando.



Poner la  **cubeta de muestra**  en el compartimento de medición. ¡Debe tenerse en cuenta el posicionamiento!



Pulsar la tecla **TEST** (XD: **START**).

A continuación se visualizará el resultado como valor de pH.

ES

## Método químico

Rojo de fenol

## Apéndice

### Interferencia

ES

#### Interferencias persistentes

1. Las muestras de agua con baja dureza de carbonato\* pueden entregar valores de pH falsos.

\* $K_{s4,3} < 0,7 \text{ mmol/l} \triangleq \text{Alcalinidad total} < 35 \text{ mg/L CaCO}_3$ .

#### Interferencias extraíbles

1. Los valores de pH inferiores a 6,5 y superiores a 8,4 pueden conducir a resultados dentro del campo de medición. Se recomienda realizar una prueba de plausibilidad (medidor de pH).

2. Error de sal:

Con concentraciones de sal de hasta 2 g/L no cabe esperar un error de sal destacable, debido a la concentración de sal de la tableta de reactivo. Cuando las concentraciones de sal son mayores, los valores de medición deben corregirse del modo siguiente:

Concentración salina de la muestra en g/L	30 (agua de mar)	60	120	180
Corrección	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup> según Kolthoff (1922)

<sup>2)</sup> según Parson y Douglas (1926)

### Bibliografía

Colorimetric Chemical Analytical Methods, 9th Edition, London



Valor de pH L

M331

6.5 - 8.4 pH

PH

Rojo de fenol

## Material

ES

Material requerido (parcialmente opcional):

Título	Verpackungseinheit	Referencia No
Solución de rojo de fenol	15 mL	471040
Solución de rojo de fenol	100 mL	471041
Solución rojo de fenol en pack de 6	1 Cantidad	471046

## Preparación

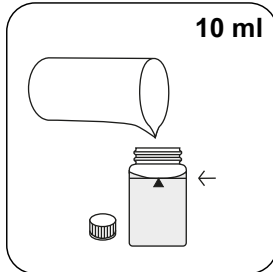
1. El tamaño de las gotas, al contrario de las tabletas, puede aumentar las desviaciones del resultado.  
Mediante el uso de una pipeta (0,18 ml corresponden a 6 gotas) se pueden minimizar estas desviaciones.

## Notas

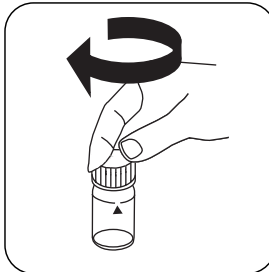
1. Después de usarla, la botella cuentagotas debe cerrarse de nuevo inmediatamente con la tapa roscada del mismo color.
2. Guardar el reactivo a una temperatura entre +6 °C y +10 °C.

## Ejecución de la determinación Valor de pH con reactivos líquidos

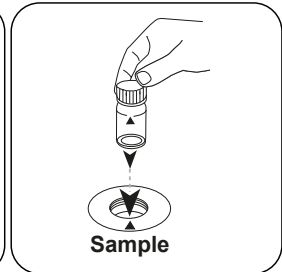
Seleccionar el método en el aparato.



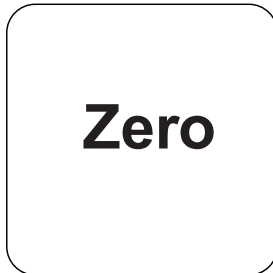
Llenar la cubeta de 24 mm con **10 ml de muestra** .



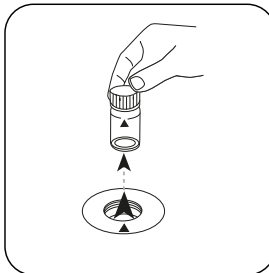
Cerrar la(s) cubeta(s).



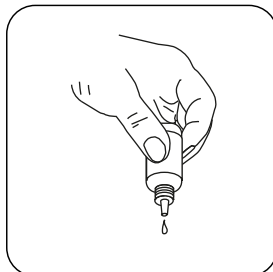
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



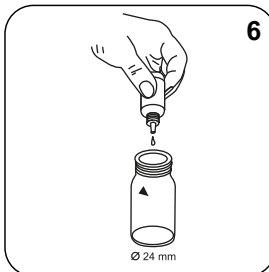
Pulsar la tecla **ZERO**.



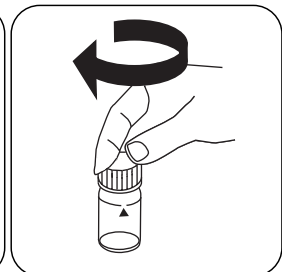
Extraer la cubeta del compartimiento de medición.



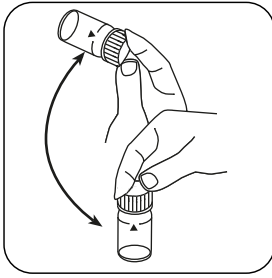
Mantener la botella cuentagotas vertical y añadir gotas del mismo tamaño presionando lentamente.



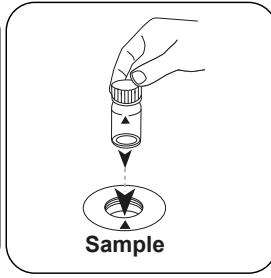
Añadir **6 gotas de PHENOL Red-Lösung**.



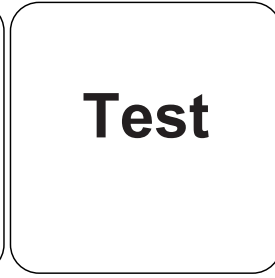
Cerrar la(s) cubeta(s).



Mezclar el contenido girando.



Poner la **cupeta de muestra** en el compartimento de medición. ¡Debe tenerse en cuenta el posicionamiento!



Pulsar la tecla **TEST** (XD: **START**).

A continuación se visualizará el resultado como valor de pH.

ES

## Método químico

Rojo de fenol

## Apéndice

### Interferencia

ES

#### Interferencias extraíbles

1. Error de sal: Corrección de valor analizado (valores medios) para muestras con una concentración salina de:

2.	Concentración salina de la muestra	Corrección
	30 g/L (agua de mar)	-0,15 <sup>1)</sup>
	60 g/L	-0,21 <sup>2)</sup>
	120 g/L	-0,26 <sup>2)</sup>
	180 g/L	-0,29 <sup>2)</sup>
	<sup>1)</sup> según Kolthoff (1922)	<sup>2)</sup> según Parson y Douglas (1926)


3. En la determinación de muestras acuosas cloradas pueden influir los restos de cloro en la reacción coloreada del reactivo líquido. Esto puede evitarse añadiendo a la muestra un pequeño cristal de tiosulfato sódico ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ), antes de incorporar el reactivo PHENOL RED.

#### Bibliografía

Colorimetric Chemical Analytical Methods, 9th Edition, London



KS4.3 T / 20



**Nom de la méthode** → KS4.3 T

**Numéro de méthode** → 20

**Code à barres pour reconnaître la méthode** → [Barcode]

**Plage de mesure** → 0.1 - 4 mmol/l  $K_{S4.3}$

**Méthode chimique** → Acide / Indicateur

**Affichage dans le MD 100 / MD 110 / MD 200** → S:4.3

**Informations spécifiques à l'instrument**

Le test peut être effectué sur les appareils suivants. De plus, la cuvette requise et la plage d'absorption du photomètre sont indiquées.

Appareils	Cuvette	$\lambda$	Gamme de mesure
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	610 nm	0.1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	ø 24 mm	615 nm	0.1 - 4 mmol/l $K_{S4.3}$

**Matériel**

Matériel requis (partiellement optionnel):

Titre	Pack contenant	Code
Alka-M-Photometer	Pastilles / 100	513210BT
Alka-M-Photometer	Pastilles / 250	513211BT

**Liste d'applications**

- Traitement des eaux usées
- Traitement de l'eau potable
- Traitement de l'eau brute

**Indication**

1. Les termes Alcalinité-m, Valeur m, Alcalinité totale et Capacité acide  $K_{S4.3}$  sont identiques.
2. L'observation exacte du volume d'échantillon de 10 ml est décisive pour l'exactitude du résultat de l'analyse.

**Codes de langue ISO 639-1** → FR

**État de révision** → 01/20

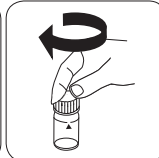
FR Méthodes Manuel 01/20

## Procédure du test

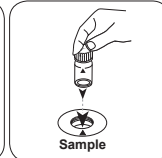
**Réalisation de la quantification Capacité acide  $K_{s4.3}$  avec pastille**

Sélectionnez la méthode sur l'appareil.

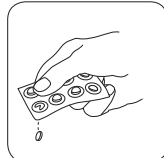
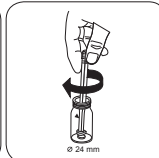
Cette méthode ne nécessite aucune mesure du zéro sur les appareils suivants : XD 7000, XD 7500

Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.

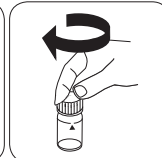
Fermez la(les) cuvette(s).

Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

• • •

Ajoutez une **pastille de ALKA-M-PHOTOMETER**.

Écrasez la(les) pastille(s) en la(les) tournant un peu.



Fermez la(les) cuvette(s).



Chlore T

M100

0.01 - 6.0 mg/L Cl<sub>2</sub> <sup>a)</sup>

CL6

DPD

## Matériel

FR

Matériel requis (partiellement optionnel):

Titre	Verpackungseinheit	Code
DPD N° 1	Pastilles / 100	511050BT
DPD N° 1	Pastilles / 250	511051BT
DPD N° 1	Pastilles / 500	511052BT
DPD N° 3	Pastilles / 100	511080BT
DPD N° 3	Pastilles / 250	511081BT
DPD N° 3	Pastilles / 500	511082BT
DPD N° 1 High Calcium <sup>e)</sup>	Pastilles / 100	515740BT
DPD N° 1 High Calcium <sup>e)</sup>	Pastilles / 250	515741BT
DPD N° 1 High Calcium <sup>e)</sup>	Pastilles / 500	515742BT
DPD N° 3 High Calcium <sup>e)</sup>	Pastilles / 100	515730BT
DPD N° 3 High Calcium <sup>e)</sup>	Pastilles / 250	515731BT
DPD N° 3 High Calcium <sup>e)</sup>	Pastilles / 500	515732BT
DPD N° 4	Pastilles / 100	511220BT
DPD N° 4	Pastilles / 250	511221BT
DPD N° 4	Pastilles / 500	511222BT
DPD N° 3 EVO	Pastilles / 100	511420BT
DPD N° 3 EVO	Pastilles / 250	511421BT
DPD N° 3 EVO	Pastilles / 500	511422BT
DPD N° 4 EVO	Pastilles / 100	511970BT
DPD N° 4 EVO	Pastilles / 250	511971BT
DPD N° 4 EVO	Pastilles / 500	511972BT
Recharge Scuba II	1 Pièces	525600

## Standards disponibles

Titre	Verpackungseinheit	Code
ValidCheck Chlore 1,5 mg/l	1 Pièces	48105510



## Échantillonnage

1. Lors de la préparation de l'échantillon, il faudra éviter le dégazage du chlore, par ex. par pipetage ou agitation.
2. L'analyse devra avoir lieu immédiatement après le prélèvement de l'échantillon.

## Préparation

1. Nettoyage des cuvettes :  
Beaucoup de produits de nettoyage domestiques (par ex. liquide vaisselle) contenant des agents réducteurs, il est possible que lors de la quantification du chlore, les résultats soient plus bas. Pour exclure ces erreurs, les instruments en verre utilisés devraient être insensibles aux effets du chlore. Pour ce faire, il convient de laisser les instruments en verre pendant une heure dans une solution d'hypochlorite de sodium (0,1 g/L) et de bien les rincer ensuite à l'eau déminéralisée (eau entièrement dessalée).
2. Pour la quantification individuelle du chlore libre et du chlore total, il est recommandé d'utiliser à chaque fois un nouveau lot de cuvettes (voir EN ISO 7393-2, § 5.3).
3. La coloration due au DPD a lieu à un pH compris entre 6,2 et 6,5. C'est pourquoi, les réactifs contiennent un tampon pour l'ajustage du pH. Avant l'analyse, les eaux fortement alcalines ou acides devraient être cependant ajustées sur un pH compris entre 6 et 7 (avec 0,5 mol/l d'acide sulfurique ou 1 mol/l de soude caustique).

## Indication

1. Les pastilles EVO peuvent être utilisées en remplacement de la pastille standard correspondante (par exemple, DPD n° 3 EVO au lieu de DPD n° 3).



## Réalisation de la quantification Chlore libre avec pastilles

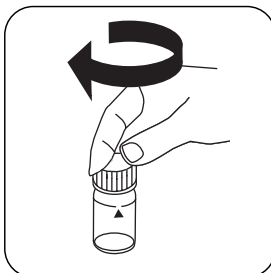
Sélectionnez la méthode sur l'appareil.

Sélectionnez également la quantification : libre

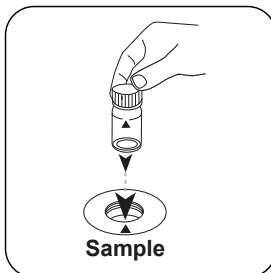
FR



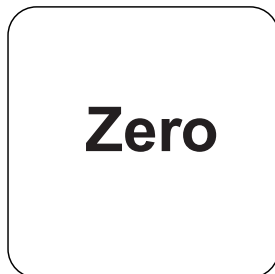
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.



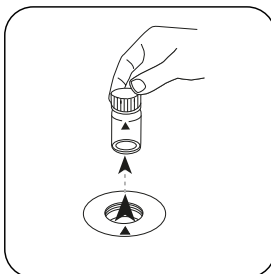
Fermez la(les) cuvette(s).



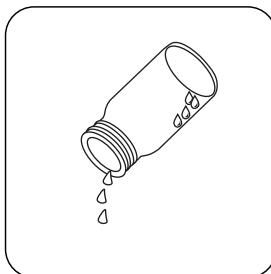
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



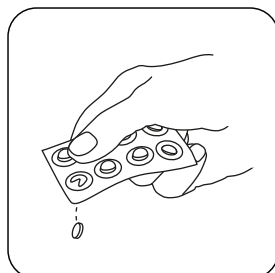
Appuyez sur la touche **ZERO**.



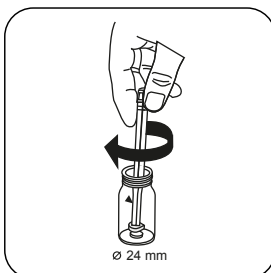
Retirez la cuvette de la chambre de mesure.



Videz pratiquement la cuvette en y laissant quelques gouttes.



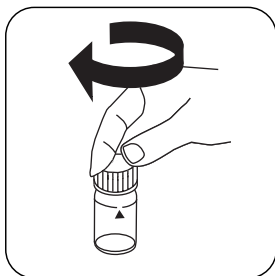
Ajoutez une **pastille de DPD No. 1**.



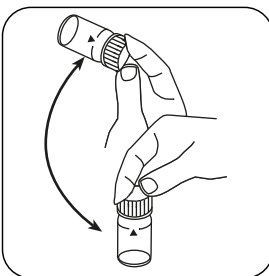
Écrasez la(les) pastille(s) en la(les) tournant un peu.



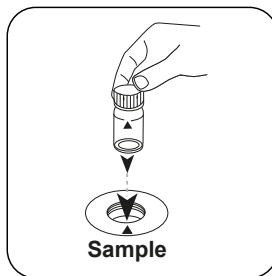
Remplissez la cuvette jusqu'au **repère de 10 ml** en y versant l'échantillon.



Fermez la(les) cuvette(s).



Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.



Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

FR

## Test

Appuyez sur la touche **TEST** (XD: **START**).

Le résultat s'affiche à l'écran en mg/l chlore libre.

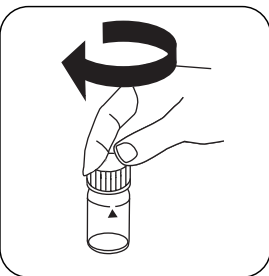
### Réalisation de la quantification Chlore total avec pastilles

Sélectionnez la méthode sur l'appareil.

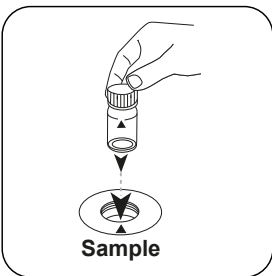
Sélectionnez également la quantification : total



Remplissez une cuvette de 24 mm de **10 ml** d'échantillon.



Fermez la(les) cuvette(s).

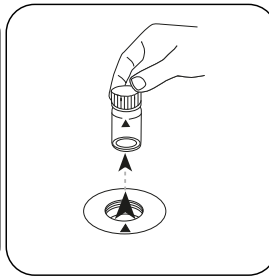


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

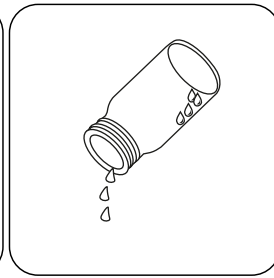


# Zero

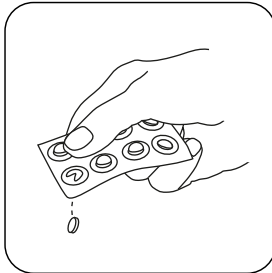
Appuyez sur la touche **ZERO**.



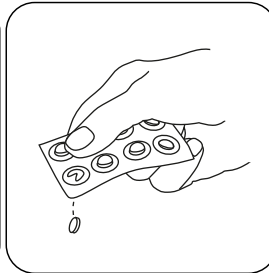
Retirez la cuvette de la chambre de mesure.



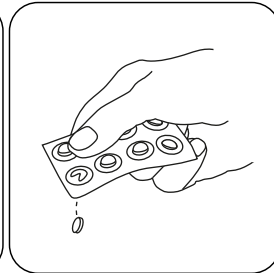
Videz pratiquement la cuvette en y laissant quelques gouttes.



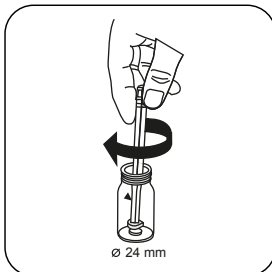
Ajoutez une **pastille de DPD No. 1**.



Ajoutez une **pastille de DPD No. 3**.



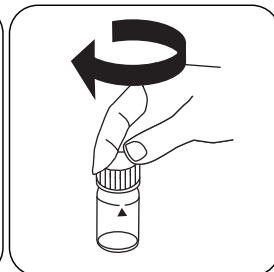
**En alternative aux comprimés DPD n° 1 et n° 3, un comprimé DPD n° 4 peut être ajouté.**



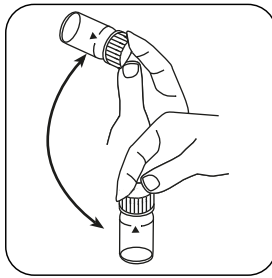
Écrasez la(les) pastille(s) en la(les) tournant un peu.



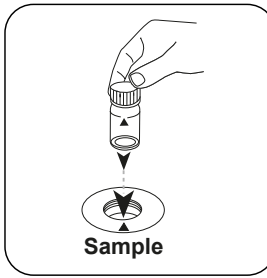
Remplissez la cuvette jusqu'au **repère de 10 ml** en y versant l'**échantillon**.



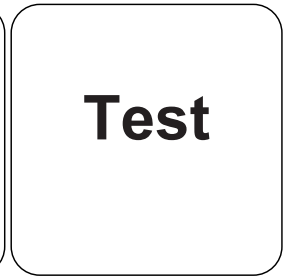
Fermez la(les) cuvette(s).



Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.

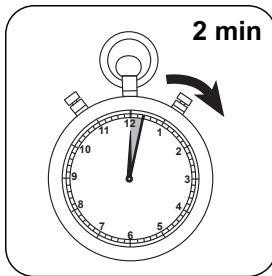


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



Appuyez sur la touche **TEST (XD: START)**.

FR



Attendez la fin du **temps de réaction de 2 minute(s)**.

À l'issue du temps de réaction, la mesure est effectuée automatiquement. Le résultat s'affiche à l'écran en mg/l chlore total.





## Méthode chimique

DPD

## Appendice

FR

### Interférences

#### Interférences persistantes

- Les agents oxydants contenus dans les échantillons réagissent tous comme le chlore, ce qui entraîne des résultats plus élevés.

#### Interférences exclues

- Les perturbations causées par le cuivre et le fer (III) seront éliminées par EDTA.
- Dans le cas des échantillons à haute concentration en calcium\* et/ou conductivité élevée\*, l'utilisation des pastilles de réactif peut causer des turbidités et donc fausser les résultats. Utilisez alors la pastille de réactif DPD N° 1 High Calcium et la pastille de réactif DPD N° 3 High Calcium.

\*Nous ne pouvons fournir de valeurs exactes, l'apparition d'une turbidité dépendant du type et de la composition de l'eau d'échantillonnage.

- Les concentrations de chlore supérieures à 10 mg/L peuvent donner des résultats dans la plage de mesure allant jusqu'à 0 mg/L en utilisant des pastilles. En cas de concentration trop élevée de chlore, diluez l'échantillon à l'eau déchlorée. Le réactif est ajouté à 10 ml d'échantillon dilué. Ensuite, la mesure est répétée (test de plausibilité).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

## Méthode Validation

Limite de détection	0.02 mg/L
Limite de détermination	0.06 mg/L
Fin de la gamme de mesure	6 mg/L
Sensibilité	2.05 mg/L / Abs
Intervalle de confiance	0.04 mg/L
Déviation standard	0.019 mg/L
Coefficient de variation	0.87 %

### Conformité

EN ISO 7393-2



<sup>a</sup>Détermination du libre, combiné et total | <sup>a</sup>autre réactif, utilisé à la place de DPD No.1/3 en cas de turbidité dans l'échantillon d'eau due à une concentration élevée de calcium et/ou une conductivité élevée

**Chlore L****M101****0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD****Matériel**

FR

Matériel requis (partiellement optionnel):

<b>Titre</b>	<b>Verpackungseinheit</b>	<b>Code</b>
DPD 1 solution tampon, flacon bleu	15 mL	471010
DPD 1 solution tampon	100 mL	471011
Solution tampon DPD 1 dans un lot de 6	1 Pièces	471016
DPD 1 solution de réactif, flacon vert	15 mL	471020
DPD 1 solution de réactif	100 mL	471021
Solution de réactif DPD 1 dans un lot de 6	1 Pièces	471026
DPD 3 solution, flacon rouge	15 mL	471030
DPD 3 solution	100 mL	471031
Solution DPD 3 dans un lot de 6	1 Pièces	471036
Kit de réactifs DPD	1 Pièces	471056

**Standards disponibles**

<b>Titre</b>	<b>Verpackungseinheit</b>	<b>Code</b>
ValidCheck Chlore 1,5 mg/l	1 Pièces	48105510

**Échantillonnage**

1. Lors de la préparation de l'échantillon, il faudra éviter le dégazage du chrome, par ex. par pipetage ou agitation.
2. L'analyse devra avoir lieu immédiatement après le prélèvement de l'échantillon.

## Préparation

1. Nettoyage des cuvettes :  
Beaucoup de produits de nettoyage domestiques (par ex. liquide vaisselle) contenant des agents réducteurs, il est possible que lors de la quantification du chlore, les résultats soient plus bas. Pour exclure ces erreurs, les instruments en verre utilisés devraient être insensibles aux effets du chlore. Pour ce faire, il convient de laisser les instruments en verre pendant une heure dans une solution d'hypochlorite de sodium (0,1 g/L) et de bien les rincer ensuite à l'eau déminéralisée (eau entièrement dessalée).
2. Pour la quantification individuelle du chlore libre et du chlore total, il est recommandé d'utiliser à chaque fois un nouveau lot de cuvettes (voir EN ISO 7393-2, § 5.3).
3. La coloration due au DPD a lieu à un pH compris entre 6,2 et 6,5. C'est pourquoi, les réactifs contiennent un tampon pour l'ajustage du pH. Avant l'analyse, les eaux fortement alcalines ou acides devraient être cependant ajustées sur un pH compris entre 6 et 7 (avec 0,5 mol/l d'acide sulfurique ou 1 mol/l de soude caustique).

## Indication

1. Après emploi, refermez immédiatement les flacons compte-goutte en utilisant le capot de même couleur.
2. Conservez le lot de réactif à une température de +6 °C à +10 °C.

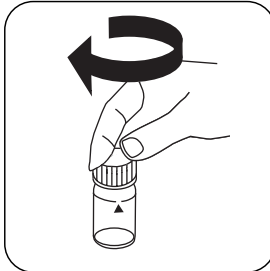


## Réalisation de la quantification Chlore libre avec réactifs liquides

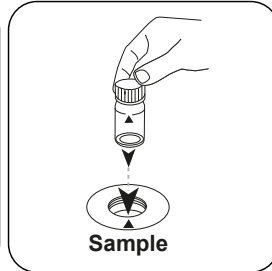
Sélectionnez la méthode sur l'appareil.  
Sélectionnez également la quantification : libre



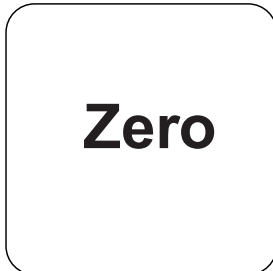
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.



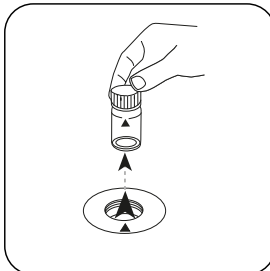
Fermez la(les) cuvette(s).



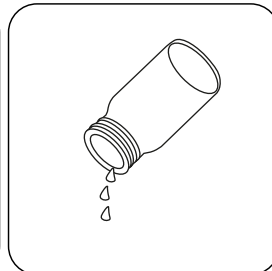
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



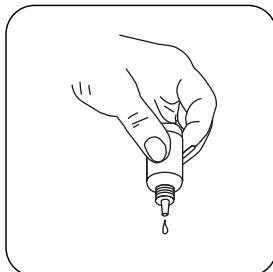
Appuyez sur la touche **ZERO**.



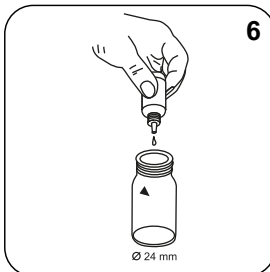
Retirez la cuvette de la chambre de mesure.



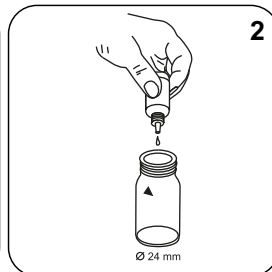
Videz la cuvette.



Tenez les flacons compte-goutte à la verticale et ajoutez des gouttes uniformes en appuyant lentement.



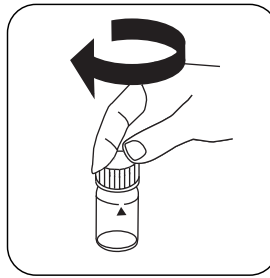
Ajoutez **6 gouttes de DPD 1 Buffer Solution**.



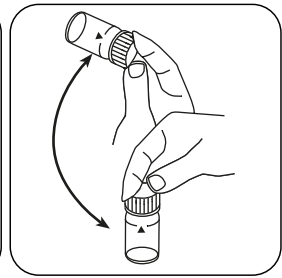
Ajoutez **2 gouttes de DPD 1 Reagent Solution**.



Remplissez la cuvette jusqu'au **repère de 10 ml** en y versant l'**échantillon**.

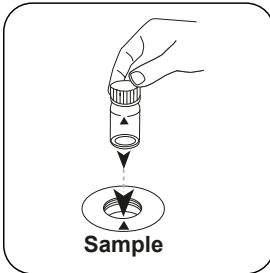


Fermez la(les) cuvette(s).

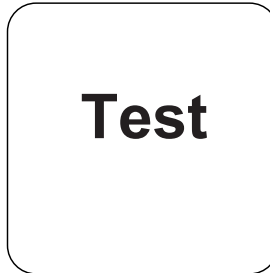


Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.

FR



Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement. Le résultat s'affiche à l'écran en mg/l chlore libre.



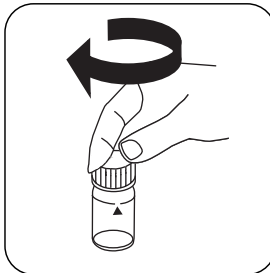
Appuyez sur la touche **TEST (XD: START)**.

## Réalisation de la quantification Chlore total avec réactifs liquides

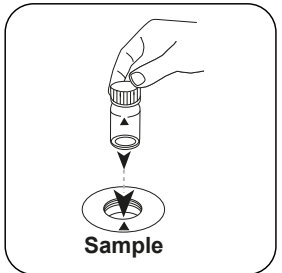
Sélectionnez la méthode sur l'appareil.  
Sélectionnez également la quantification : total



Remplissez une cuvette de 24 mm de **10 ml** d'**échantillon**.



Fermez la(les) cuvette(s).

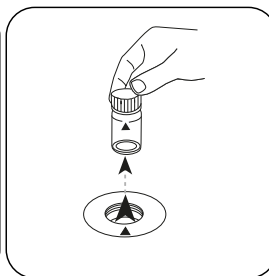


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

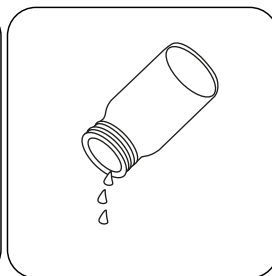


# Zero

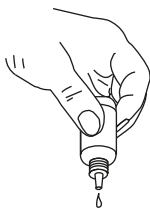
Appuyez sur la touche **ZERO**.



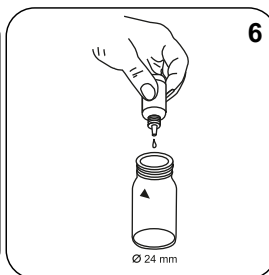
Retirez la cuvette de la chambre de mesure.



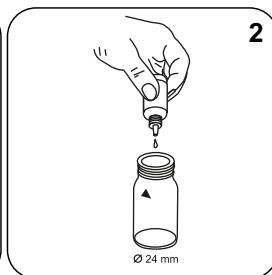
Videz la cuvette.



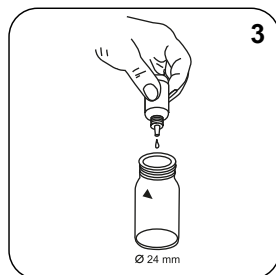
Tenez les flacons compte-goutte à la verticale et ajoutez des gouttes uniformes en appuyant lentement.



Ajoutez **6 gouttes de DPD 1 Buffer Solution**.



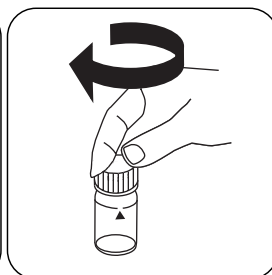
Ajoutez **2 gouttes de DPD 1 Reagent Solution**.



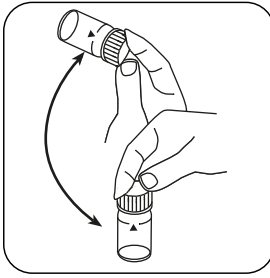
Ajoutez **3 gouttes de DPD 3 Solution**.



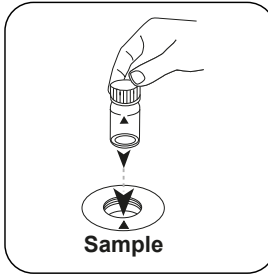
Remplissez la cuvette jusqu'au **repère de 10 ml** en y versant l'échantillon.



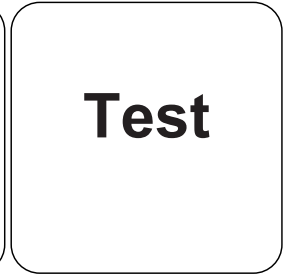
Fermez la(les) cuvette(s).



Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.

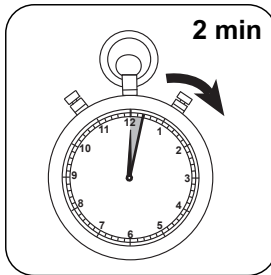


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



Appuyez sur la touche **TEST (XD: START)**.

FR



Attendez la fin du **temps de réaction de 2 minute(s)**.

À l'issue du temps de réaction, la mesure est effectuée automatiquement. Le résultat s'affiche à l'écran en mg/l chlore total.





## Méthode chimique

DPD

## Appendice

FR

### Interférences

#### Interférences persistantes

- Les agents oxydants contenus dans les échantillons réagissent tous comme le chlore, ce qui entraîne des résultats plus élevés.

#### Interférences exclues

- Les perturbations causées par le cuivre et le fer (III) seront éliminées par EDTA.
- Les concentrations de chlore supérieures à 4 mg/L peuvent donner des résultats dans la plage de mesure allant jusqu'à 0 mg/L en utilisant des réactifs liquides. Dans ce cas, diluez l'échantillon à l'eau déchlorée. Le réactif est ajouté à 10 ml d'échantillon dilué. Ensuite, la mesure est répétée (test de plausibilité).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0,01
MnO <sub>2</sub>	0,01

#### Conformité

EN ISO 7393-2

<sup>a)</sup>Détermination du libre, combiné et total





Valeur du pH T

M330

6.5 - 8.4 pH

PH

Rouge de phénol

FR

## Matériel

Matériel requis (partiellement optionnel):

Titre	Verpackungseinheitcode	
Rouge de phénol Photomètre	Pastilles / 100	511770BT
Rouge de phénol Photomètre	Pastilles / 250	511771BT
Rouge de phénol Photomètre	Pastilles / 500	511772BT

## Indication

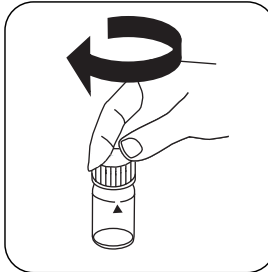
1. Pour la quantification photométrique du pH, n'utilisez que des pastilles PHENOL RED avec étiquette noire, sur lesquelles le terme PHOTOMER est apposé.

## Réalisation de la quantification Valeur du pH avec pastille

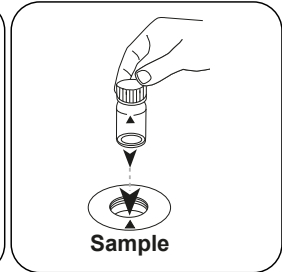
Sélectionnez la méthode sur l'appareil.



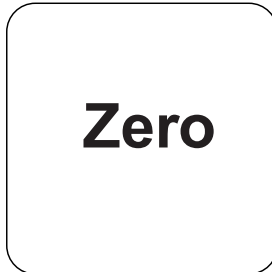
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.



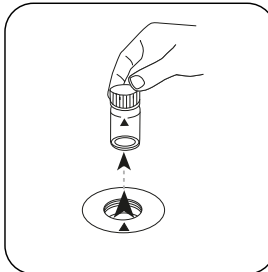
Fermez la(les) cuvette(s).



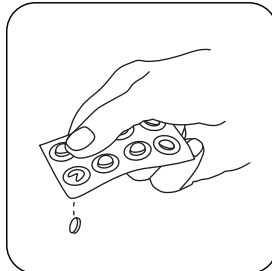
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



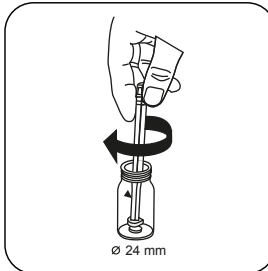
Appuyez sur la touche **ZERO**.



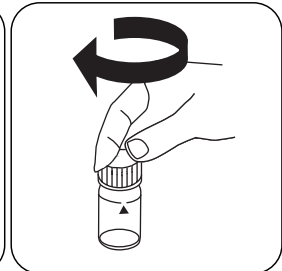
Retirez la cuvette de la chambre de mesure.



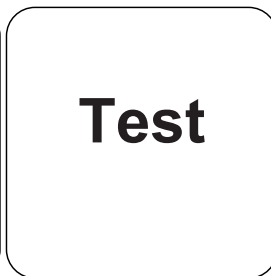
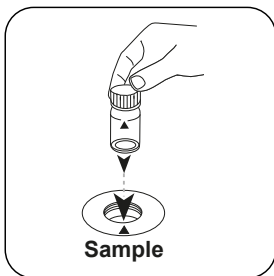
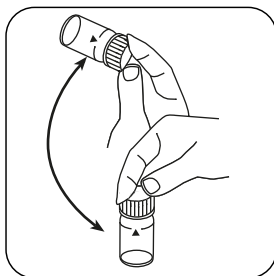
Ajoutez une **pastille de PHENOL RED PHOTOMETER**.



Écrasez la(les) pastille(s) en la(les) tournant un peu.



Fermez la(les) cuvette(s).



FR

Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.

Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

Appuyez sur la touche **TEST (XD: START)**.

Le résultat s'affiche à l'écran en valeur du pH.

## Méthode chimique

Rouge de phénol

## Appendice

### Interférences

FR

#### Interférences persistantes

1. Les échantillons d'eau avec faible dureté carbonatée\* peuvent fausser les pH.  
\* $K_{S_{4,3}} < 0,7$  mmol/l  $\triangleq$  alcalinité totale  $< 35$  mg/L  $CaCO_3$ .

#### Interférences exclues

1. Les pH inférieurs à 6,5 et supérieurs à 8,4 peuvent provoquer des résultats dans la plage de mesure. Il est recommandé d'effectuer un test de plausibilité (appareil de mesure du pH).
2. Erreur de sel :  
À des concentrations du sel jusqu'à 2 g/L, il ne faut s'attendre à aucune erreur digne de ce nom en raison de la concentration en sel de la pastille de réactif. À des concentrations supérieures, les valeurs mesurées seront corrigées comme suit :

Concentration en sel de l'échantillon en g/L	30 (eau de mer)	60	120	180
Correction	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup> selon Kolthoff (1922)

<sup>2)</sup> selon Parson et Douglas (1926)

#### Bibliographie

Colorimetric Chemical Analytical Methods, 9th Edition, London



Valeur du pH L

M331

6.5 - 8.4 pH

PH

Rouge de phénol

FR

## Matériel

Matériel requis (partiellement optionnel):

Titre	Verpackungseinheitcode	
Solution de phénol rouge	15 mL	471040
Solution de phénol rouge	100 mL	471041
Solution de phénol rouge dans un lot de 6	1 Pièces	471046

## Préparation

1. En raison des différentes tailles de gouttes, le résultat peut présenter des écarts supérieurs à ceux des pastilles.

Cet écart peut être réduit à un minimum en utilisant une pipette (0,18 ml correspondent à 6 gouttes).

## Indication

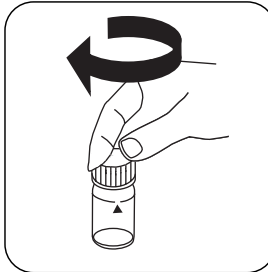
1. Après emploi, refermez immédiatement le flacon compte-goutte en utilisant le capot de même couleur.
2. Conservez le réactif à une température de +6 °C à +10 °C.

## Réalisation de la quantification Valeur du pH avec réactif liquide

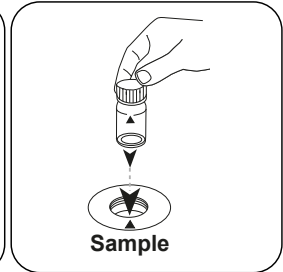
Sélectionnez la méthode sur l'appareil.



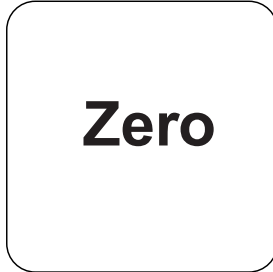
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.



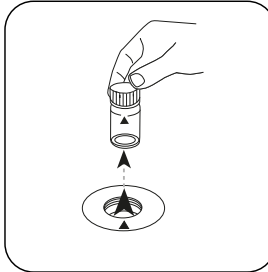
Fermez la(les) cuvette(s).



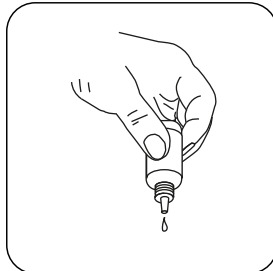
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



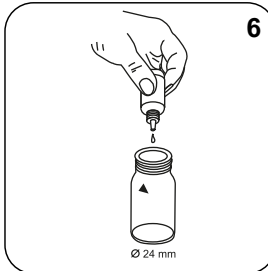
Appuyez sur la touche **ZERO**.



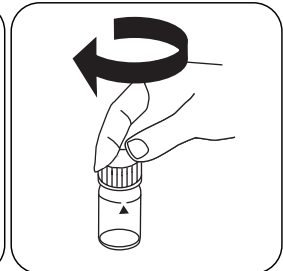
Retirez la cuvette de la chambre de mesure.



Tenez les flacons compte-goutte à la verticale et ajoutez des gouttes uniformes en appuyant lentement.

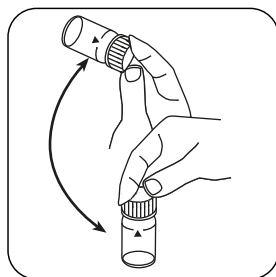


Ajoutez **6 gouttes de PHENOL Red-Lösung**.



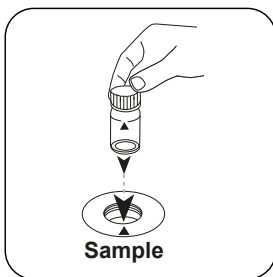
Fermez la(les) cuvette(s).



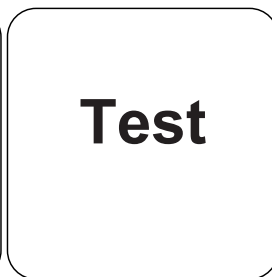


Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.

Le résultat s'affiche à l'écran en valeur du pH.



Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



Appuyez sur la touche **TEST (XD: START)**.

FR

## Méthode chimique

Rouge de phénol

## Appendice

### Interférences

FR

#### Interférences exclues

1. Erreur de sel : Correction de la mesure du sel (valeurs moyennes) pour les échantillons présentant une concentration en sel de :


2. Concentration en sel de l'échantillon	Correction
30 g/L (eau de mer)	-0,15 <sup>1)</sup>
60 g/L	-0,21 <sup>2)</sup>
120 g/L	-0,26 <sup>2)</sup>
180 g/L	-0,29 <sup>2)</sup>
<sup>1)</sup> selon Kolthoff (1922)	<sup>2)</sup> selon Parson et Douglas (1926)

3. Lors de l'analyse de l'eau chlorée, la concentration résiduelle en chlore peut influencer la coloration du réactif liquide. Ceci est empêché en introduisant un petit cristal de hiosulfate de sodium ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) dans la solution d'échantillonnage avant d'ajouter la solution PHENOL RED.

#### Bibliographie

Colorimetric Chemical Analytical Methods, 9th Edition, London

KS4.3 T / 20



**Denominazione metodo**

**Numero metodo**

**Codice a barre per riconoscere il metodo**

**Range di misura**

$K_{S_{4.3} T}$   
0.1 - 4 mmol/l  $K_{S_{4.3}}$

20  
S:4.3

**Indicazione sul display del MD 100 / MD 110 / MD 200**

**Metodo chimico**

**Acido/indicatore**

**Informazioni specifiche dello strumento**

Il test può essere eseguito sui seguenti dispositivi. Inoltre, sono indicate la cuvetta richiesta e il range di assorbimento del fotometro.

Dispositivi	Cuvetta	$\lambda$	Campo di misura
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	610 nm	0.1 - 4 mmol/l $K_{S_{4.3}}$
SpectroDirect, XD 7000, XD 7500	ø 24 mm	615 nm	0.1 - 4 mmol/l $K_{S_{4.3}}$

**Materiale**

Materiale richiesto (in parte facoltativo):

Titolo	Unità di imballaggio	N. ordine
Alka-M-Photometer	Pastiglia / 100	513210BT
Alka-M-Photometer	Pastiglia / 250	513211BT

**Campo di applicazione**

- Trattamento acqua di scarico
- Trattamento acqua potabile
- Trattamento acqua non depurata

**Note**

1. I termini alcalinità M, valore M, alcalinità totale e capacità acida  $K_{S_{4.3}}$  sono equivalenti.
2. Per l'accuratezza del risultato dell'analisi è fondamentale che il volume del campione misuri esattamente 10 ml.

**ISO 639-1 codici linguistici**

**Stato di revisione**

IT Manuale dei Metodi 01/20

**Svolgimento della  
misurazione**

**Esecuzione della rilevazione Capacità acida  $K_{s4.3}$  con pastiglia**

Selezionare il metodo nel dispositivo.

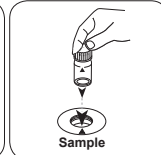
Con i seguenti dispositivi, per questo metodo non è necessario eseguire una misurazione ZERO: XD 7000, XD 7500



Riempire una cuvetta da 24 mm con **10 ml di campione**.

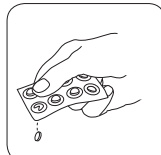


Chiudere la/e cuvetta/e.

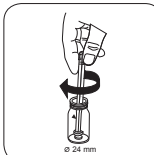


Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

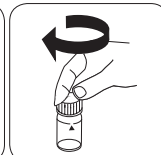
• • •



Aggiungere una pastiglia **ALKA-M-PHOTOMETER**.



Frantumare la/e pastiglia/e con una leggera rotazione.



Chiudere la/e cuvetta/e.

**Cloro T****M100****0.01 - 6.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD**

IT

**Materiale**

Materiale richiesto (in parte facoltativo):

<b>Titolo</b>	<b>Verpackungseinheit</b>	<b>N. ordine</b>
DPD No. 1	Pastiglia / 100	511050BT
DPD No. 1	Pastiglia / 250	511051BT
DPD No. 1	Pastiglia / 500	511052BT
DPD No. 3	Pastiglia / 100	511080BT
DPD No. 3	Pastiglia / 250	511081BT
DPD No. 3	Pastiglia / 500	511082BT
DPD No. 1 Alto Calcio <sup>e)</sup>	Pastiglia / 100	515740BT
DPD No. 1 Alto Calcio <sup>e)</sup>	Pastiglia / 250	515741BT
DPD No. 1 Alto Calcio <sup>e)</sup>	Pastiglia / 500	515742BT
DPD No. 3 High Calcium <sup>e)</sup>	Pastiglia / 100	515730BT
DPD No. 3 High Calcium <sup>e)</sup>	Pastiglia / 250	515731BT
DPD No. 3 High Calcium <sup>e)</sup>	Pastiglia / 500	515732BT
DPD No. 4	Pastiglia / 100	511220BT
DPD No. 4	Pastiglia / 250	511221BT
DPD No. 4	Pastiglia / 500	511222BT
DPD No. 3 EVO	Pastiglia / 100	511420BT
DPD No. 3 EVO	Pastiglia / 250	511421BT
DPD No. 3 EVO	Pastiglia / 500	511422BT
DPD No. 4 EVO	Pastiglia / 100	511970BT
DPD No. 4 EVO	Pastiglia / 250	511971BT
DPD No. 4 EVO	Pastiglia / 500	511972BT
Confezione di ricarica Suba II	1 pz.	525600

**Standards disponibles**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>N. ordine</b>
ValidCheck Cloro 1,5 mg/l	1 pz.	48105510

## Prelievo del campione

1. Nella preparazione del campione occorre evitare la degassificazione del cloro, ad es. utilizzando pipette e agitando.
2. L'analisi deve essere eseguita subito dopo il prelievo del campione.

## Preparazione

1. Pulizia delle cuvette:  
Poiché molti detersivi ad uso domestico (ad es. detersivo per piatti) contengono sostanze riducenti, nella rilevazione del cloro si potrebbero ottenere risultati troppo bassi. Per escludere tali errori di misura è necessario che i dispositivi in vetro siano esenti dal consumo di cloro. I dispositivi in vetro inoltre vengono conservati in una soluzione di ipoclorito di sodio (0,1 g/L) per un'ora e successivamente vengono risciacquati abbondantemente con acqua demineralizzata.
2. Per la singola rilevazione del cloro libero e del cloro totale è opportuno utilizzare un apposito kit di cuvette per ciascuna procedura (vedere EN ISO 7393-2, par. 5.3).
3. Lo sviluppo della colorazione del DPD avviene con un valore di pH compreso tra 6,2 e 6,5. I reagenti contengono pertanto un tampone per la regolazione del valore di pH. Le acque fortemente alcaline o acide tuttavia devono essere portate prima dell'analisi entro un range di pH compreso tra 6 e 7 (con 0,5 mol/l di acido solforico o 1 mol/l di liscivia).

## Note

1. Le compresse EVO possono essere utilizzate come alternativa alla corrispondente compressa standard (ad esempio DPD No. 3 EVO invece di DPD No. 3).



## Esecuzione della rilevazione Cloro, libero con compressa

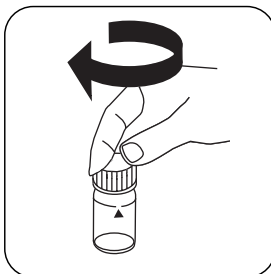
Selezionare il metodo nel dispositivo.

Selezionare inoltre la determinazione: libero

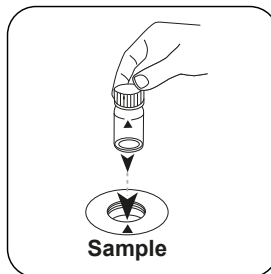
IT



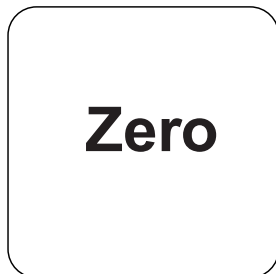
Riempire una cuvetta da 24 mm con **10 ml di campione**.



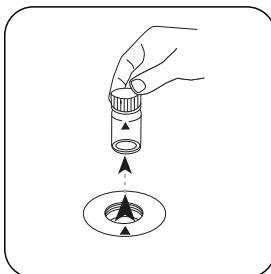
Chiudere la/e cuvetta/e.



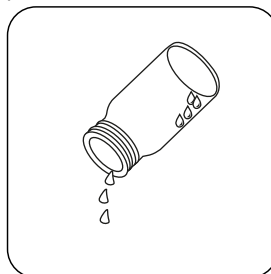
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



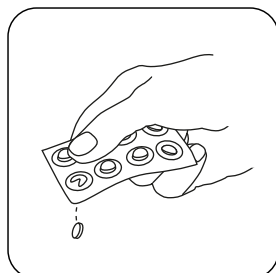
Premere il tasto **ZERO**.



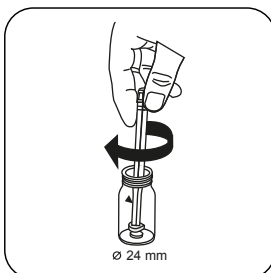
Prelevare la cuvetta dal vano di misurazione.



Svuotare la cuvetta finché non rimangono alcune gocce.



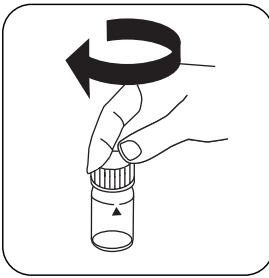
Aggiungere **una pastiglia DPD No. 1**.



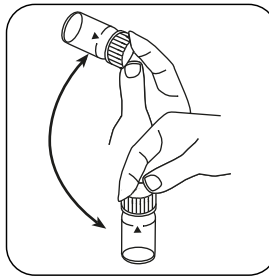
Frantumare la/e pastiglia/e con una leggera rotazione.



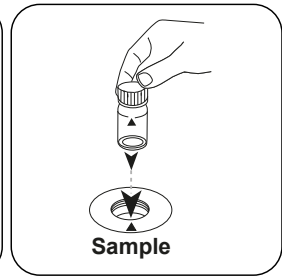
Immettere il **campione** nella cuvetta fino a raggiungere la **tacca dei 10 ml**.



Chiudere la/e cuvetta/e.



Far sciogliere la/e pastiglia/e agitando.



Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

IT

# Test

Premere il tasto **TEST** (XD: **START**).

Sul display compare il risultato in mg/l di Cloro libero.

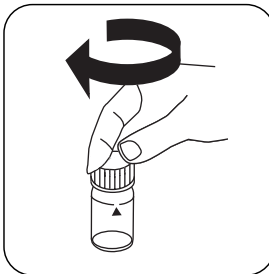
## Esecuzione della rilevazione Cloro, totale con compressa

Selezionare il metodo nel dispositivo.

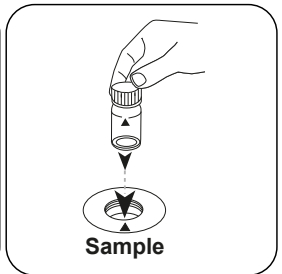
Selezionare inoltre la determinazione: totale



Riempire una cuvetta da 24 mm con **10 ml di campione**.



Chiudere la/e cuvetta/e.



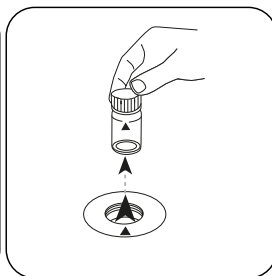
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



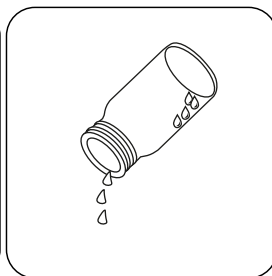


# Zero

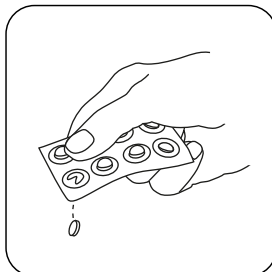
Premere il tasto **ZERO**.



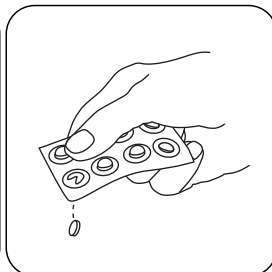
Prelevare la cuvetta dal vano di misurazione.



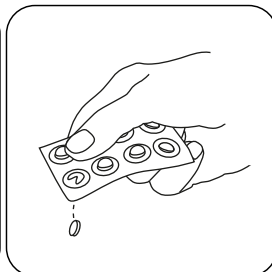
Svuotare la cuvetta finché non rimangono alcune gocce.



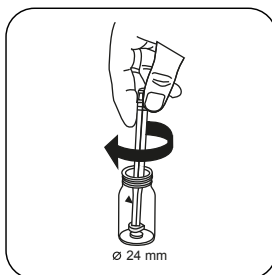
Aggiungere **una pastiglia DPD No. 1**.



Aggiungere **una pastiglia DPD No. 3**.



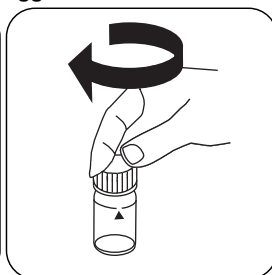
**In alternativa al DPD No. 1 e No. 3 tablet, un DPD No. 4 tablet può essere aggiunto.**



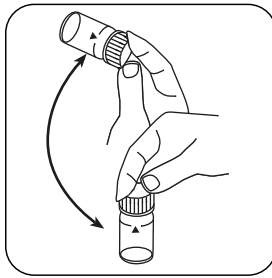
Frantumare la/e pastiglia/e con una leggera rotazione.



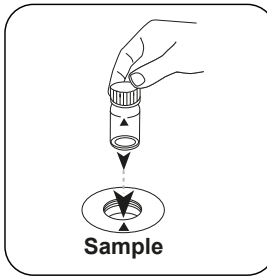
Immettere il **campione** nella cuvetta fino a raggiungere la **tacca dei 10 ml**.



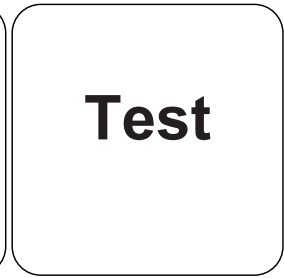
Chiudere la/e cuvetta/e.



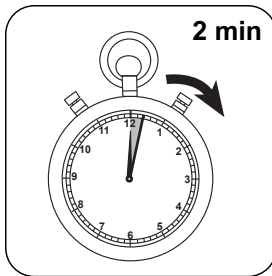
Far sciogliere la/e pastiglia/e agitando.



Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



Premere il tasto **TEST** (XD: **START**).



Attendere un **tempo di reazione di 2 minuto/i** .

Allo scadere del tempo di reazione viene effettuata automaticamente la misurazione. Sul display compare il risultato in mg/l di Cloro totale.



## Metodo chimico

DPD

## Appendice

IT

### Interferenze

#### Interferenze permanenti

- Tutti gli ossidanti presenti nei campioni reagiscono come il cloro dando risultati troppo elevati.

#### Interferenze escludibili

- Le interferenze da parte di rame e ferro(III) devono essere eliminate con EDTA.
- In caso di campioni con un elevato tenore di calcio\* e/o un'elevata conducibilità\*, utilizzando le pastiglie di reagenti potrebbe verificarsi un intorbidimento del campione con conseguenti errori di misurazione. In questo caso si possono utilizzare in alternativa la pastiglia di reagente DPD No. 1 High Calcium e la pastiglia di reagente DPD No. 3 High Calcium.  
\*Non è possibile indicare i valori esatti in quanto l'intorbidimento dipende dal tipo e dalla composizione dell'acqua campione.
- Se si utilizzano pastiglie, le concentrazioni di cloro maggiori di 10 mg/L possono dare risultati entro il range di misura fino a 0 mg/L. Se la concentrazione di cloro è troppo elevata, il campione deve essere diluito con acqua priva di cloro. 10 ml del campione diluito vengono addizionati con il reagente e la misurazione viene ripetuta (test di plausibilità).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

### Validazione metodo

Limite di rilevabilità	0.02 mg/L
Limite di quantificazione	0.06 mg/L
Estremità campo di misura	6 mg/L
Sensibilità	2.05 mg/L / Abs
Intervallo di confidenza	0.04 mg/L
Deviazione standard della procedura	0.019 mg/L
Coefficiente di variazione della procedura	0.87 %



**Conforme**

EN ISO 7393-2

\*Determinazione di libero, vincolato, totale possibile | \*Reagente ausiliario, in alternativa a DPD n. 1 / no 3 in caso di torbidità del campione a causa di alto contenuto di ioni di calcio e / o alta conduttività

IT

**Cloro L****M101****0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD**

IT

**Materiale**

Materiale richiesto (in parte facoltativo):

<b>Titolo</b>	<b>Verpackungseinheit</b>	<b>N. ordine</b>
DPD 1 soluzione tampone, bottiglia blu	15 mL	471010
Soluzione tampone DPD 1	100 mL	471011
DPD 1 Soluzione tampone in confezione da 6	1 pz.	471016
DPD 1 soluzione reagente, bottiglia verde	15 mL	471020
Soluzione reagente DPD 1	100 mL	471021
DPD 1 Soluzione reagente in confezione da 6	1 pz.	471026
DPD 3 soluzione, bottiglia rossa	15 mL	471030
Soluzione DPD 3	100 mL	471031
DPD 3 Soluzione in confezione da 6	1 pz.	471036
Set di reagenti DPD	1 pz.	471056

**Standards disponibles**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>N. ordine</b>
ValidCheck Cloro 1,5 mg/l	1 pz.	48105510

**Prelievo del campione**

1. Nella preparazione del campione occorre evitare la degassificazione del cloro, ad es. utilizzando pipette e agitando.
2. L'analisi deve essere eseguita subito dopo il prelievo del campione.



## Preparazione

1. Pulizia delle cuvette:  
Poiché molti detersivi ad uso domestico (ad es. detersivo per piatti) contengono sostanze riducenti, nella rilevazione del cloro si potrebbero ottenere risultati troppo bassi. Per escludere tali errori di misura è necessario che i dispositivi in vetro siano esenti dal consumo di cloro. I dispositivi in vetro inoltre vengono conservati in una soluzione di ipoclorito di sodio (0,1 g/L) per un'ora e successivamente vengono risciacquati abbondantemente con acqua demineralizzata.
2. Per la singola rilevazione del cloro libero e del cloro totale è opportuno utilizzare un apposito kit di cuvette per ciascuna procedura (vedere EN ISO 7393-2, par. 5.3).
3. Lo sviluppo della colorazione del DPD avviene con un valore di pH compreso tra 6,2 e 6,5. I reagenti contengono pertanto un tampone per la regolazione del valore di pH. Le acque fortemente alcaline o acide tuttavia devono essere portate prima dell'analisi entro un range di pH compreso tra 6 e 7 (con 0,5 mol/l di acido solforico o 1 mol/l di liscivia).

## Note

1. Dopo l'uso bisogna richiudere immediatamente le boccette contagocce con i rispettivi tappi dello stesso colore.
2. Conservare al fresco il kit di reagenti a una temperatura compresa tra +6 °C e +10 °C.



## Esecuzione della rilevazione Cloro, libero con reagente liquido

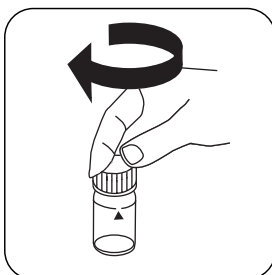
Selezionare il metodo nel dispositivo.

Selezionare inoltre la determinazione: libero

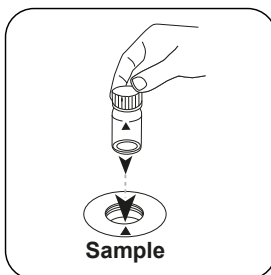
IT



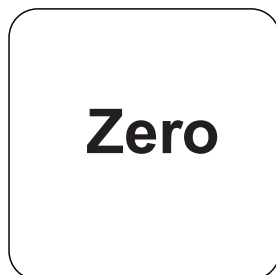
Riempire una cuvetta da 24 mm con **10 ml di campione**.



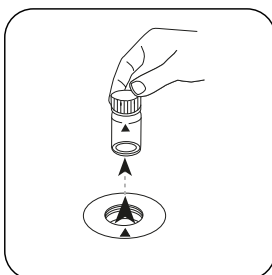
Chiudere la/e cuvetta/e.



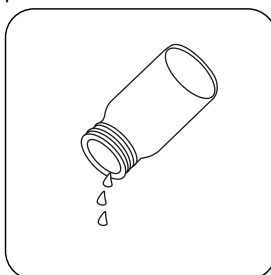
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



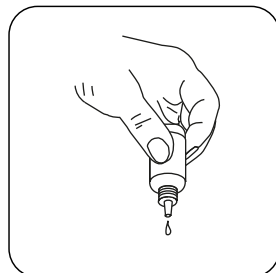
Premere il tasto **ZERO**.



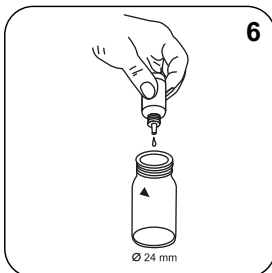
Prelevare la cuvetta dal vano di misurazione.



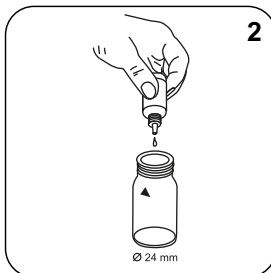
Svuotare la cuvetta.



Tenere le boccette contagocce in posizione verticale e introdurre, premendo lentamente, gocce della stessa dimensione nella cuvetta.



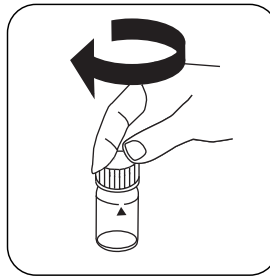
Aggiungere **6 gocce di DPD 1 Buffer Solution**.



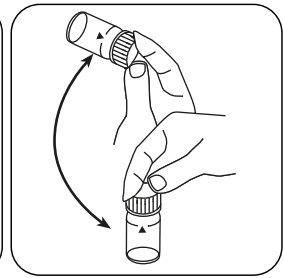
Aggiungere **2 gocce di DPD 1 Reagent Solution**.



Immettere il **campione** nella cuvetta fino a raggiungere la **tacca dei 10 ml**.

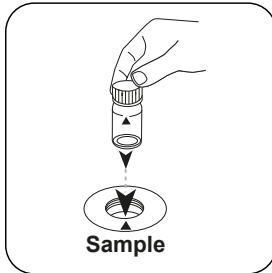


Chiudere la/e cuvetta/e.

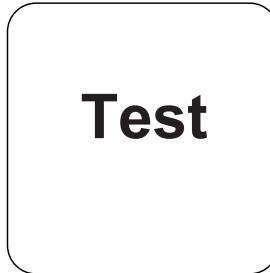


Miscelare il contenuto capovolgendo.

IT



Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento. Sul display compare il risultato in mg/l di Cloro libero.



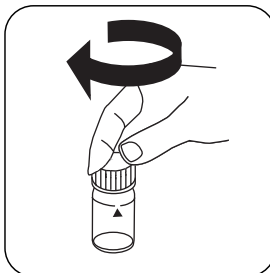
Premere il tasto **TEST** (XD: **START**).

## Esecuzione della rilevazione Cloro, totale con reagente liquido

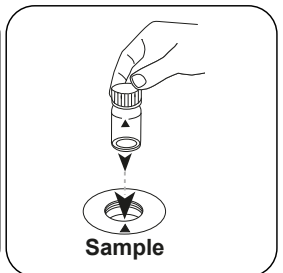
Selezionare il metodo nel dispositivo.  
Selezionare inoltre la determinazione: totale



Riempire una cuvetta da 24 mm con **10 ml di campione**.



Chiudere la/e cuvetta/e.



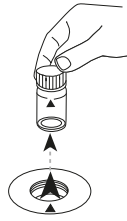
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.





# Zero

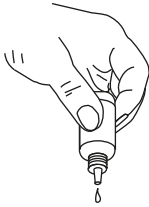
Premere il tasto **ZERO**.



Prelevare la cuvetta dal vano di misurazione.



Svuotare la cuvetta.



Tenere le boccette contagocce in posizione verticale e introdurre, premendo lentamente, gocce della stessa dimensione nella cuvetta.



**6**

Aggiungere **6 gocce di DPD 1 Buffer Solution**.



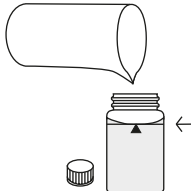
**2**

Aggiungere **2 gocce di DPD 1 Reagent Solution**.

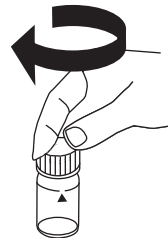


**3**

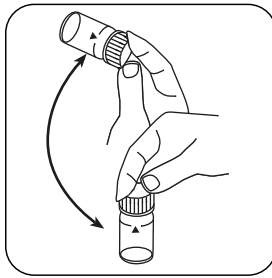
Aggiungere **3 gocce di DPD 3 Solution**.



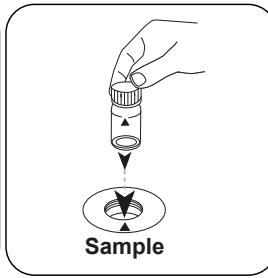
Immettere il **campione** nella cuvetta fino a raggiungere la **tacca dei 10 ml**.



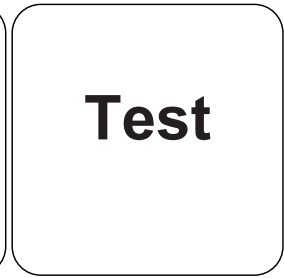
Chiudere la/e cuvetta/e.



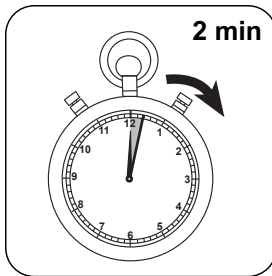
Miscelare il contenuto capovolgendo.



Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



Premere il tasto **TEST** (XD: **START**).



Attendere un **tempo di reazione di 2 minuto/i** .

Allo scadere del tempo di reazione viene effettuata automaticamente la misurazione. Sul display compare il risultato in mg/l di Cloro totale.



## Metodo chimico

DPD

## Appendice

IT

### Interferenze

#### Interferenze permanenti

- Tutti gli ossidanti presenti nei campioni reagiscono come il cloro dando risultati troppo elevati.

#### Interferenze escludibili

- Le interferenze da parte di rame e ferro(III) devono essere eliminate con EDTA.
- Se si utilizzano reagenti liquidi, le concentrazioni di cloro maggiori di 4 mg/L possono dare risultati entro il range di misura fino a 0 mg/L. In questo caso il campione deve essere diluito con acqua priva di cloro. 10 ml del campione diluito vengono addizionati con il reagente e la misurazione viene ripetuta (test di plausibilità).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0,01
$\text{MnO}_2$	0,01

#### Conforme

EN ISO 7393-2

<sup>\*)</sup>Determinazione di libero, vincolato, totale possibile





Valore pH T

M330

6.5 - 8.4 pH

PH

Rosso fenolo

IT

## Materiale

Materiale richiesto (in parte facoltativo):

<b>Titolo</b>	<b>Verpackungseinheit</b>	<b>N. ordine</b>
Fotometro rosso fenolo	Pastiglia / 100	511770BT
Fotometro rosso fenolo	Pastiglia / 250	511771BT
Fotometro rosso fenolo	Pastiglia / 500	511772BT

## Note

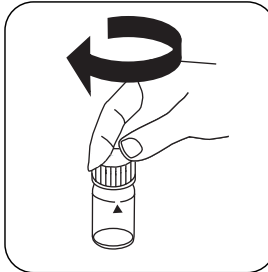
1. Per la rilevazione fotometrica del valore di pH si devono utilizzare soltanto pastiglie PHENOL RED con etichetta nera contrassegnate con il termine PHOTOMETER.

## Esecuzione della rilevazione Valore pH con pastiglia

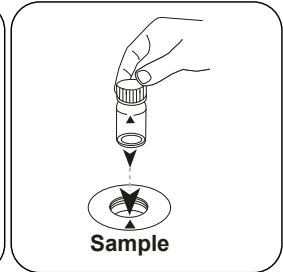
Selezionare il metodo nel dispositivo.



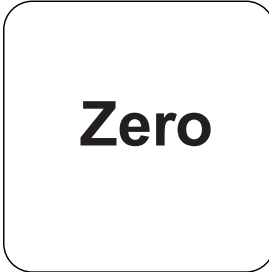
Riempire una cuvetta da 24 mm con **10 ml di campione**.



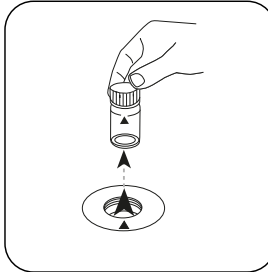
Chiudere la/e cuvetta/e.



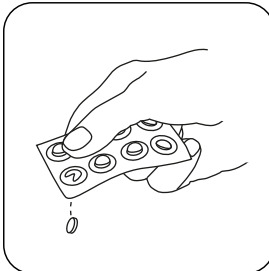
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



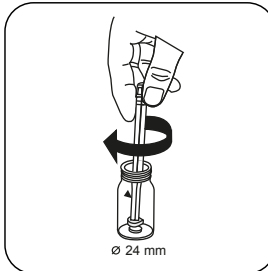
Premere il tasto **ZERO**.



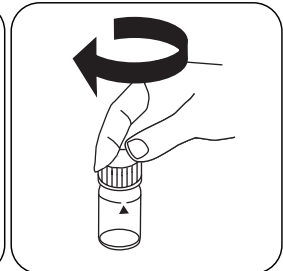
Prelevare la cuvetta dal vano di misurazione.



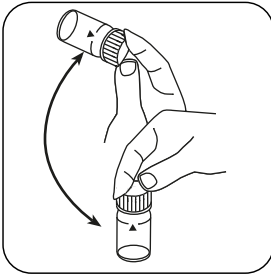
Aggiungere una **pastiglia PHENOL RED PHOTOMETER**.



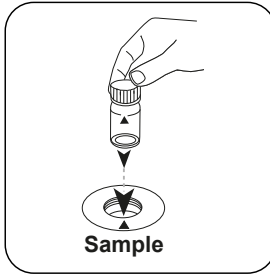
Frantumare la/e pastiglia/e con una leggera rotazione.



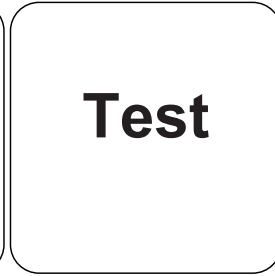
Chiudere la/e cuvetta/e.



Far sciogliere la/e  
pastiglia/e agitando.



Posizionare la **cuvetta  
del campione** nel  
vano di misurazione.  
Fare attenzione al  
posizionamento.



Premere il tasto **TEST** (XD:  
**START**).

Sul display compare il risultato come valore pH.

IT

## Metodo chimico

Rosso fenolo

## Appendice

### Interferenze

#### Interferenze permanenti

1. I campioni di acqua con una bassa durezza carbonatica\* possono far ottenere valori di pH errati.

\* $K_{S4,3} < 0,7$  mmol/l  $\triangleq$  alcalinità totale  $< 35$  mg/L  $\text{CaCO}_3$ .

#### Interferenze escludibili

1. I valori di pH minori di 6,5 e maggiori di 8,4 possono dare risultati entro il range di misura. Si consiglia un test di plausibilità (misuratore di pH).
2. Errore salino:  
Con una salinità fino a 2 g/L non è previsto alcun errore salino significativo dovuto alla salinità della pastiglia di reagente. Con salinità maggiori è necessario correggere i valori di misura nel modo seguente:

Salinità del campione in g/L	30 (acqua di mare)	60	120	180
Correzione	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup> secondo Kolthoff (1922)

<sup>2)</sup> secondo Parson e Douglas (1926)

#### Riferimenti bibliografici

Colorimetric Chemical Analytical Methods, 9th Edition, London





Valore pH L

M331

6.5 - 8.4 pH

PH

Rosso fenolo

IT

## Materiale

Materiale richiesto (in parte facoltativo):

Titolo	Verpackungseinheit	N. ordine
Soluzione di rosso fenolo	15 mL	471040
Soluzione di rosso fenolo	100 mL	471041
Soluzione di rosso fenolo in confezione da 6	1 pz.	471046

## Preparazione

- Per via della dimensione variabile delle gocce, il risultato della misurazione può presentare divergenze maggiori di quanto avvenga con l'uso delle pastiglie.  
Utilizzando una pipetta (0,18 ml corrispondono a 6 gocce) si può ridurre al minimo questa divergenza.

## Note

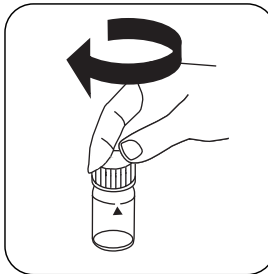
- Dopo l'uso bisogna richiudere immediatamente la boccetta contagocce con il relativo tappo dello stesso colore.
- Conservare al fresco il reagente a una temperatura compresa tra +6 °C e +10 °C.

## Esecuzione della rilevazione Valore pH con reagente liquido

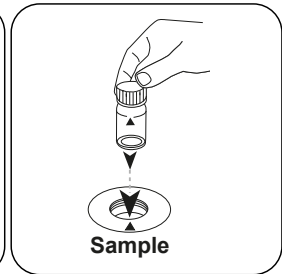
Selezionare il metodo nel dispositivo.



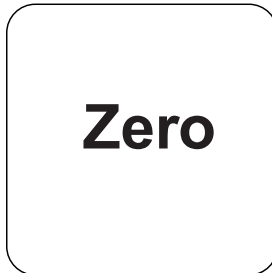
Riempire una cuvetta da 24 mm con **10 ml di campione**.



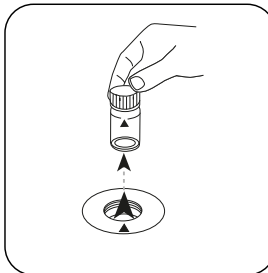
Chiudere la/e cuvetta/e.



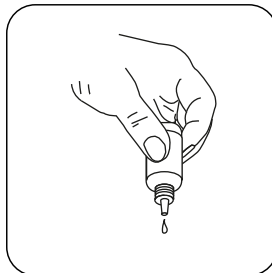
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



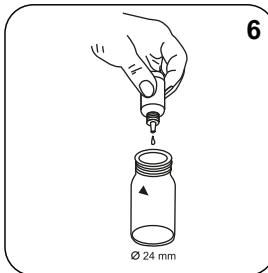
Premere il tasto **ZERO**.



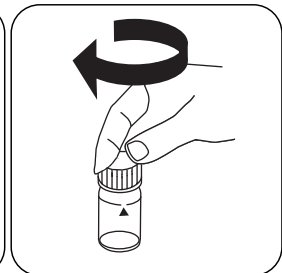
Prelevare la cuvetta dal vano di misurazione.



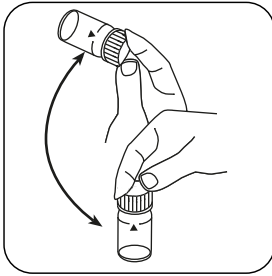
Tenere le boccette contagocce in posizione verticale e introdurre, premendo lentamente, gocce della stessa dimensione nella cuvetta.



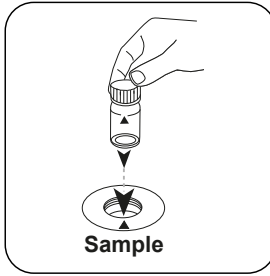
Aggiungere **6 gocce di PHENOL Red-Lösung**.



Chiudere la/e cuvetta/e.

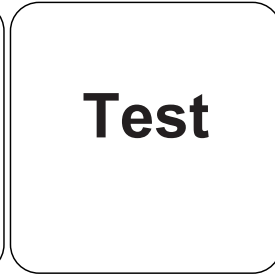


Miscelare il contenuto capovolgendo.



Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

Sul display compare il risultato come valore pH.



# Test

Premere il tasto **TEST** (XD: **START**).

## Metodo chimico

Rosso fenolo

## Appendice

### Interferenze

#### Interferenze escludibili

1. Errore salino: Correzione del valore di misura (valori medi) per i campioni con una salinità di:


2.	Salinità del campione	Correzione
	30 g/L (acqua di mare)	-0,15 <sup>1)</sup>
	60 g/L	-0,21 <sup>2)</sup>
	120 g/L	-0,26 <sup>2)</sup>
	180 g/L	-0,29 <sup>2)</sup>
	<sup>1)</sup> secondo Kolthoff (1922)	<sup>2)</sup> secondo Parson e Douglas (1926)

3. Nell'analisi di acqua clorurata, il tenore di cloro residuo può influenzare la reazione cromatica del reagente liquido. Tale interferenza viene evitata immettendo un piccolo cristallo di tiosolfato di sodio ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) nella soluzione campione prima di aggiungere la soluzione PHENOL RED.

#### Riferimenti bibliografici

Colorimetric Chemical Analytical Methods, 9th Edition, London

KS4.3 T / 20



**Nome do método**

**Número do método**

**Código de barras para a detecção dos métodos**

**Área de medição**

$K_{S_{4.3}} T$   
0.1 - 4 mmol/l  $K_{S_{4.3}}$   
Ácido / Indicador

20  
S:4.3

**Método Químico**

**Indicado no display: MD 100 / MD 110 / MD 200**

**Informação específica do instrumento**

O teste pode ser realizado nos seguintes dispositivos. Além disso, a cubeta necessária e a faixa de absorção do fotómetro são indicadas.

Dispositivos	Cubeta	$\lambda$	Faixa de Medição
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	ø 24 mm	610 nm	0.1 - 4 mmol/l $K_{S_{4.3}}$
SpectroDirect, XD 7000, XD 7500	ø 24 mm	615 nm	0.1 - 4 mmol/l $K_{S_{4.3}}$

**Material**

Material necessário (parcialmente opcional):

Título	Unidade de Embalagem	Artigo No
Alka-M-Photometer	Pastilhas / 100	513210BT
Alka-M-Photometer	Pastilhas / 250	513211BT

**Lista de Aplicações**

- Tratamento de Esgotos
- Tratamento de Água Potável
- Tratamento de Água Bruta

**Notas**

1. Os termos alcalinidade-m, m-valor, alcalinidade total e capacidade de acidez  $K_{S_{4.3}}$  são idênticos.
2. O cumprimento exato do volume da amostra de 10 ml é decisivo para a precisão do resultado de análise.

**Códigos de idioma ISO 639-1**

**Nível de revisão**

PT Métodos Manual 01/20

Efetuar a medição

### Realização da determinação Capacidade de acidez $K_{s4.3}$ com pastilha

Escolher o método no equipamento.

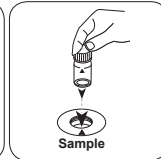
Para este método não tem de ser efetuada uma medição ZERO nos seguintes equipamentos: XD 7000, XD 7500



Encher a célula de 24 mm com 10 ml de amostra .

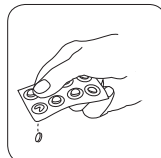


Fechar a(s) célula(s).

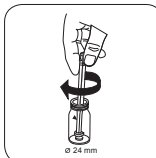


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

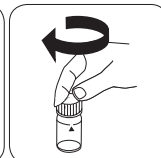
• • •



Pastilha ALKA-M-PHOTO-METER.



Esmagar a(s) pastilha(s) rodando ligeiramente.



Fechar a(s) célula(s).

PT Métodos Manual 01/20

PT

**Cloro T****M100****0.01 - 6.0 mg/L Cl<sub>2</sub> <sup>a)</sup>****CL6****DPD****Material**

PT

Material necessário (parcialmente opcional):

<b>Título</b>	<b>Verpackungseinheit</b>	<b>Artigo No</b>
DPD Nº. 1	Pastilhas / 100	511050BT
DPD Nº. 1	Pastilhas / 250	511051BT
DPD Nº. 1	Pastilhas / 500	511052BT
DPD Nº. 3	Pastilhas / 100	511080BT
DPD Nº. 3	Pastilhas / 250	511081BT
DPD Nº. 3	Pastilhas / 500	511082BT
DPD Nº. 1 Alto Cálcio <sup>e)</sup>	Pastilhas / 100	515740BT
DPD Nº. 1 Alto Cálcio <sup>e)</sup>	Pastilhas / 250	515741BT
DPD Nº. 1 Alto Cálcio <sup>e)</sup>	Pastilhas / 500	515742BT
DPD Nº. 3 Alto Cálcio <sup>e)</sup>	Pastilhas / 100	515730BT
DPD Nº. 3 Alto Cálcio <sup>e)</sup>	Pastilhas / 250	515731BT
DPD Nº. 3 Alto Cálcio <sup>e)</sup>	Pastilhas / 500	515732BT
DPD Nº. 4	Pastilhas / 100	511220BT
DPD Nº. 4	Pastilhas / 250	511221BT
DPD Nº. 4	Pastilhas / 500	511222BT
DPD Nº. 3 EVO	Pastilhas / 100	511420BT
DPD Nº. 3 EVO	Pastilhas / 250	511421BT
DPD Nº. 3 EVO	Pastilhas / 500	511422BT
DPD Nº. 4 EVO	Pastilhas / 100	511970BT
DPD Nº. 4 EVO	Pastilhas / 250	511971BT
DPD Nº. 4 EVO	Pastilhas / 500	511972BT
Embalagem de recarga Suba II	1 pc.	525600

**Padrões disponíveis**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>Artigo No</b>
ValidCheck Cloro 1,5 mg/l	1 pc.	48105510

## Amostragem

1. Na preparação da amostra é preciso evitar a libertação de gases de cloro, p. ex. através da pipetagem e agitação.
2. A análise tem de ser efetuada logo após a recolha da amostra.

## Preparação

1. Limpeza das células:  
Uma vez que muitos produtos de limpeza domésticos (p. ex. lava-louça) contêm substâncias redutoras, na determinação de cloro pode haver demasiadas reduções. Para excluir este erro de medição, os equipamentos de vidro não deviam ter a capacidade de absorção de cloro. Para esse efeito, os equipamentos de vidro são guardados por uma hora sob solução de hipoclorito de sódio (0,1 g/L) e depois devem ser bem enxaguados com água desmineralizada.
2. Para a determinação individual de cloro livre e cloro total é conveniente usar respetivamente um conjunto próprio de células (ver EN ISO 7393-2, alínea 5.3).
3. A formação de cores DPD ocorre com um valor pH entre 6,2 e 6,5. Os reagentes contêm, por isso, um tampão para ajustar o valor pH. As águas fortemente alcalinas ou ácidas devem, porém, antes da análise, ser ajustadas para um valor pH entre 6 e 7 (com 0,5 mol/l de ácido sulfúrico ou 1 mol/l soda cáustica).

## Notas

1. Os pastilhas EVO podem ser utilizadas como alternativa à pastilha padrão correspondente (por exemplo, DPD N° 3 EVO em vez da DPD N° 3).





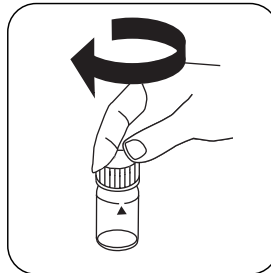
## Realização da determinação Cloro livre com pastilha

Escolher o método no equipamento.

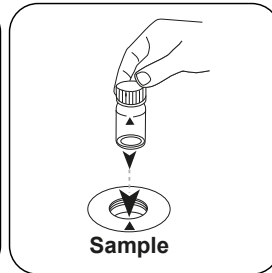
Escolha ainda a determinação: livre



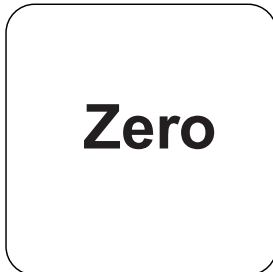
Encher a célula de 24 mm com **10 ml de amostra** .



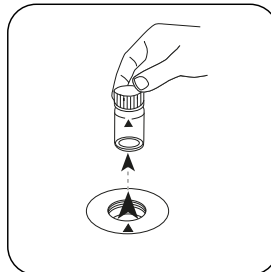
Fechar a(s) célula(s).



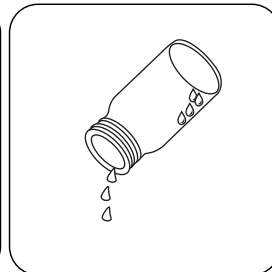
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



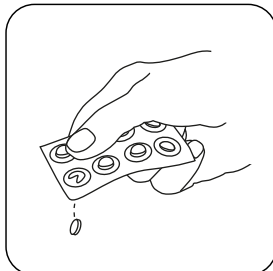
Premir a tecla **ZERO**.



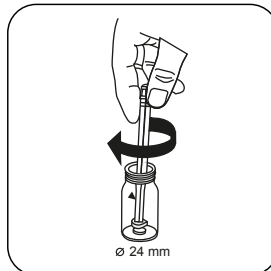
Retirar a célula do compartimento de medição.



Esvaziar a célula até ficarem apenas algumas gotas.



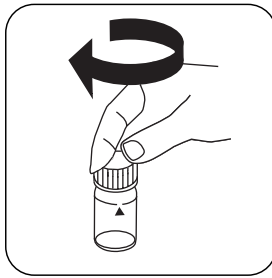
**Pastilha DPD No. 1.**



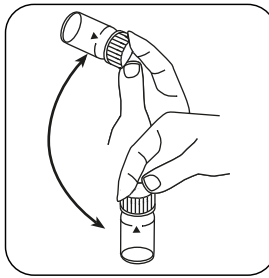
Esmagar a(s) pastilha(s) rodando ligeiramente.



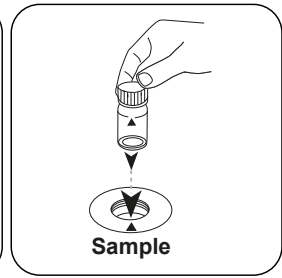
Encher a célula até à **marca de 10 ml** com a **amostra** .



Fechar a(s) célula(s).



Dissolver a(s) pastilha(s) girando.



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

PT

# Test

Premir a tecla **TEST** (XD: **START**).

No visor aparece o resultado em mg/l Cloro livre.

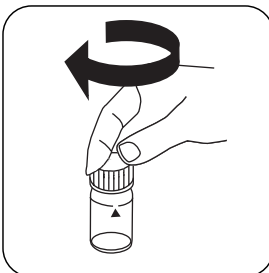
## Realização da determinação Cloro total com pastilha

Escolher o método no equipamento.

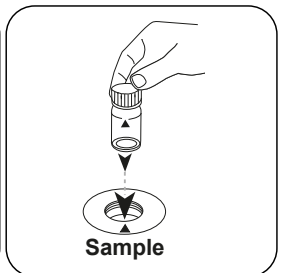
Escolha ainda a determinação: total



Encher a célula de 24 mm com **10 ml de amostra**.



Fechar a(s) célula(s).

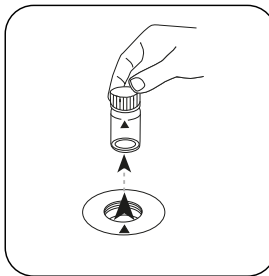


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

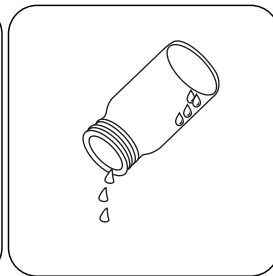


# Zero

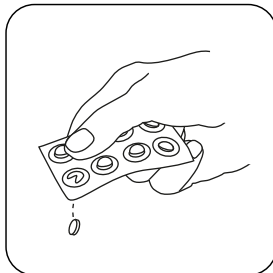
PT Premir a tecla **ZERO**.



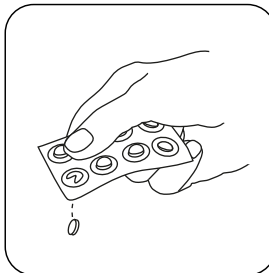
Retirar a célula do compartimento de medição.



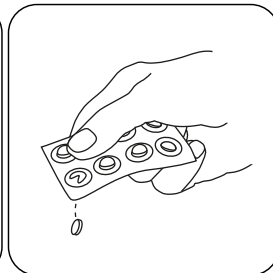
Esvaziar a célula até ficarem apenas algumas gotas.



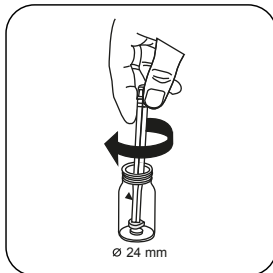
Pastilha DPD No. 1.



Pastilha DPD No. 3.



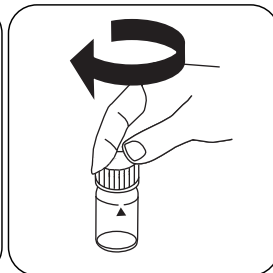
Como alternativa aos comprimidos DPD No. 1 e No. 3, pode ser adicionado 1 comprimido DPD No. 4.



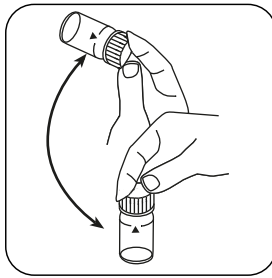
Esmagar a(s) pastilha(s) rodando ligeiramente.



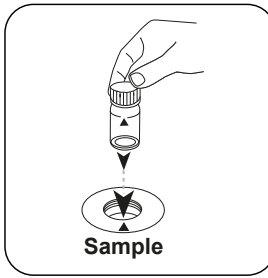
Encher a célula até à marca de 10 ml com a amostra .



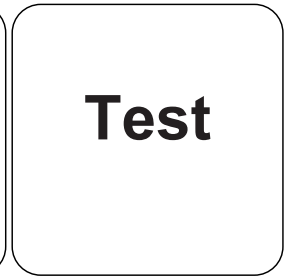
Fechar a(s) célula(s).



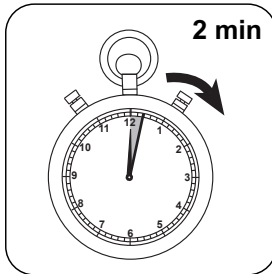
Dissolver a(s) pastilha(s) girando.



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



Premir a tecla **TEST** (XD: **START**).



Aguardar **2 minuto(s) de tempo de reação**.

Decorrido o tempo de reação, a medição é efetuada automaticamente. No visor aparece o resultado em mg/l Cloro total.



## Método Químico

DPD

## Apêndice

PT

### Texto de Interferências

#### Interferências Persistentes

- Todos os oxidantes presentes nas amostras reagem como o cloro, o que leva a resultados demasiado altos.

#### Interferências Removíveis

- As interferências por cobre e ferro(III) devem ser eliminadas por EDTA.
- Nas amostras com elevado teor de cálcio\* e/ou elevada condutividade\* pode ocorrer, se forem usadas as pastilhas de reagente, uma turvação da amostra e, por conseguinte, a medição pode ficar errada. Neste caso, deve usar em alternativa a pastilha de reagente DPD No. 1 High Calcium e a pastilha de reagente DPD No. 3 High Calcium.  
\*não podem ser indicados valores exatos, uma vez que a formação de uma turvação depende do tipo e da composição da água da amostra.
- Concentrações de cloro superiores a 10 mg/L, se forem usadas pastilhas, podem causar resultados dentro da área de medição até 0 mg/L. No caso de uma concentração demasiado alta de cloro, deve diluir a amostra com água sem cloro. 10 ml da amostra diluída é colocada em reagente e a medição é repetida (teste de plausibilidade).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

### Validação de método

Limite de Detecção	0.02 mg/L
Limite de Determinação	0.06 mg/L
Fim da Faixa de Medição	6 mg/L
Sensibilidade	2.05 mg/L / Abs
Faixa de Confiança	0.04 mg/L
Desvio Padrão	0.019 mg/L
Coefficiente de Variação	0.87 %



## Conformidade

EN ISO 7393-2

<sup>a</sup>Determinação do possível livre, vinculado, total | <sup>a</sup>Reagente auxiliar, alternativamente ao DPD no. 1 / não 3 quando a amostra é nublada devido ao alto teor de íons de cálcio e / ou alta condutividade

**Cloro L****M101****0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD**

PT

**Material**

Material necessário (parcialmente opcional):

<b>Título</b>	<b>Verpackungseinheit</b>	<b>Artigo No</b>
DPD 1 solução tampão, frasco azul	15 mL	471010
Solução tampão DPD 1	100 mL	471011
DPD 1 solução tampão em embalagem de 6	1 pc.	471016
Solução de reagente DPD 1, frasco verde	15 mL	471020
Solução de reagente DPD 1	100 mL	471021
Solução de reagente DPD 1 numa embalagem de 6 unidades	1 pc.	471026
DPD 3 Solução, frasco vermelho	15 mL	471030
Solução DPD 3	100 mL	471031
Solução DPD 3 numa embalagem de 6 unidades	1 pc.	471036
Kit de reagentes DPD	1 pc.	471056

**Padrões disponíveis**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>Artigo No</b>
ValidCheck Cloro 1,5 mg/l	1 pc.	48105510

**Amostragem**

1. Na preparação da amostra é preciso evitar a libertação de gases de cloro, p. ex. através da pipetagem e agitação.
2. A análise tem de ser efetuada logo após a recolha da amostra.

## Preparação

1. Limpeza das células:  
Uma vez que muitos produtos de limpeza domésticos (p. ex. lava-louça) contêm substâncias redutoras, na determinação de cloro pode haver demasiadas reduções. Para excluir este erro de medição, os equipamentos de vidro não deviam ter a capacidade de absorção de cloro. Para esse efeito, os equipamentos de vidro são guardados por uma hora sob solução de hipoclorito de sódio (0,1 g/L) e depois devem ser bem enxaguados com água desmineralizada.
2. Para a determinação individual de cloro livre e cloro total é conveniente usar respetivamente um conjunto próprio de células (ver EN ISO 7393-2, alínea 5.3).
3. A formação de cores DPD ocorre com um valor pH entre 6,2 e 6,5. Os reagentes contêm, por isso, um tampão para ajustar o valor pH. As águas fortemente alcalinas ou ácidas devem, porém, antes da análise, ser ajustadas para um valor pH entre 6 e 7 (com 0,5 mol/l de ácido sulfúrico ou 1 mol/l soda cáustica).

## Notas

1. Depois de usados, os frascos conta-gotas devem ser novamente fechados com a respetiva tampa de enroscar à cor.
2. Guardar o conjunto de reagentes em local fresco entre +6 °C e +10 °C.





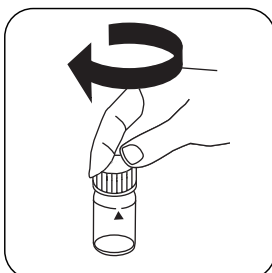
## Realização da determinação Cloro livre com reagente líquido

Escolher o método no equipamento.

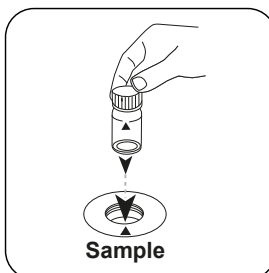
Escolha ainda a determinação: livre



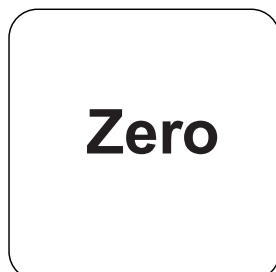
Encher a célula de 24 mm com **10 ml de amostra**.



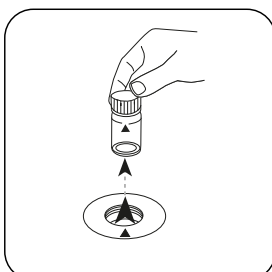
Fechar a(s) célula(s).



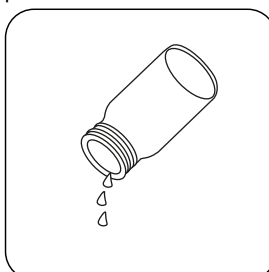
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



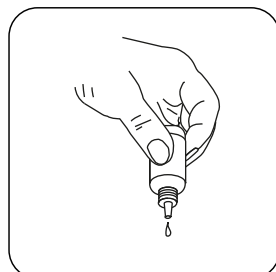
Premir a tecla **ZERO**.



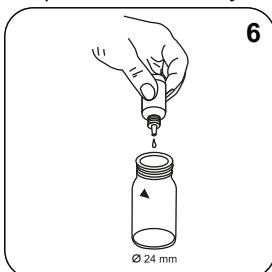
Retirar a célula do compartimento de medição.



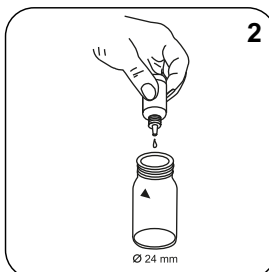
Esvaziar a célula.



Manter os frascos conta gotas na vertical e pressionar lentamente para adicionar gotas de igual dimensão.



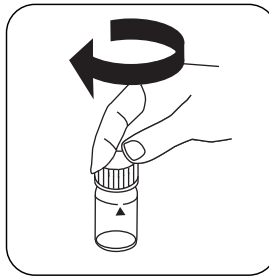
Adicionar **6 gotas DPD 1 Buffer Solution**.



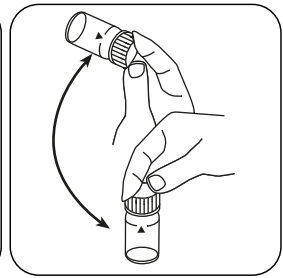
Adicionar **2 gotas DPD 1 Reagent Solution**.



Encher a célula até à **marca de 10 ml** com a **amostra**.

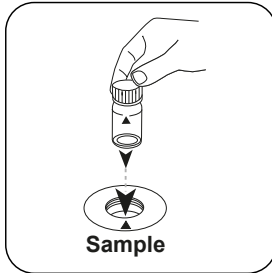


Fechar a(s) célula(s).



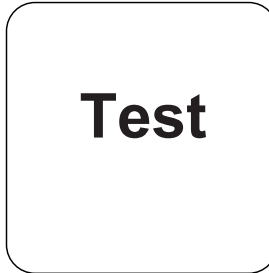
Misturar o conteúdo girando.

PT



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

No visor aparece o resultado em mg/l Cloro livre.



Premir a tecla **TEST** (XD: **START**).

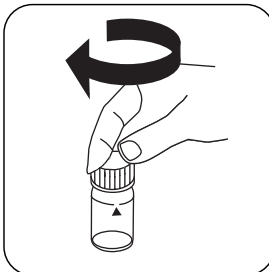
## Realização da determinação Cloro total com reagente líquido

Escolher o método no equipamento.

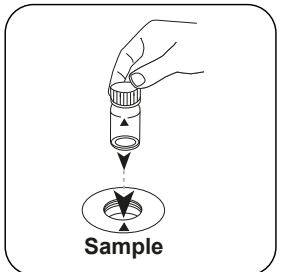
Escolha ainda a determinação: total



Encher a célula de 24 mm com **10 ml de amostra**.



Fechar a(s) célula(s).

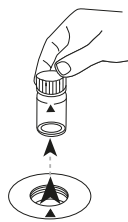


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

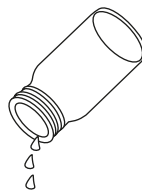


# Zero

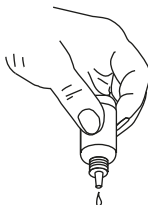
Premir a tecla **ZERO**.



Retirar a célula do compartimento de medição.



Esvaziar a célula.



Manter os frascos conta gotas na vertical e pressionar lentamente para adicionar gotas de igual dimensão.



**6**

Adicionar **6 gotas DPD 1 Buffer Solution**.



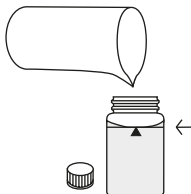
**2**

Adicionar **2 gotas DPD 1 Reagent Solution**.

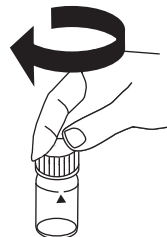


**3**

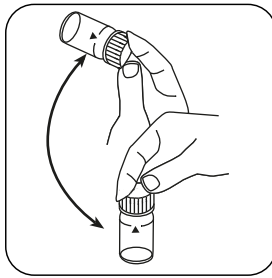
Adicionar **3 gotas DPD 3 Solution**.



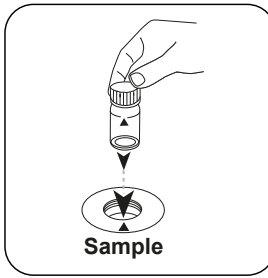
Encher a célula até à **marca de 10 ml** com a amostra.



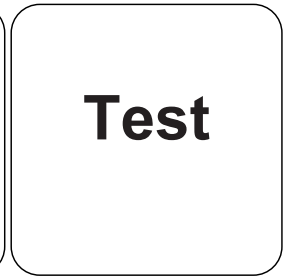
Fechar a(s) célula(s).



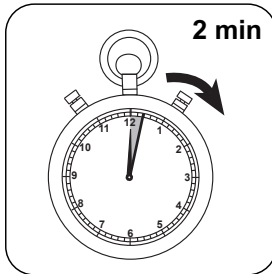
Misturar o conteúdo girando.



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



Premir a tecla **TEST** (XD: **START**).



Aguardar **2 minuto(s) de tempo de reação**.

Decorrido o tempo de reação, a medição é efetuada automaticamente. No visor aparece o resultado em mg/l Cloro total.



## Método Químico

DPD

## Apêndice

PT

### Texto de Interferências

#### Interferências Persistentes

- Todos os oxidantes presentes nas amostras reagem como o cloro, o que leva a resultados demasiado altos.

#### Interferências Removíveis

- As interferências por cobre e ferro(III) devem ser eliminadas por EDTA.
- Concentrações de cloro superiores a 4 mg/L, se forem usados reagentes líquidos, podem causar resultados dentro da área de medição até 0 mg/L. Neste caso, deve diluir a amostra com água sem cloro. 10 ml da amostra diluída é colocada em reagente e a medição é repetida (teste de plausibilidade).

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0,01
$\text{MnO}_2$	0,01

#### Conformidade

EN ISO 7393-2

<sup>\*)</sup>Determinação do possível livre, vinculado, total





Valor pH T

M330

6.5 - 8.4 pH

PH

Phenol Red

PT

## Material

Material necessário (parcialmente opcional):

Título	Verpackungseinheit	Artigo No
Fotómetro Fenol Vermelho	Pastilhas / 100	511770BT
Fotómetro Fenol Vermelho	Pastilhas / 250	511771BT
Fotómetro Fenol Vermelho	Pastilhas / 500	511772BT

## Notas

1. Para a determinação fotométrica do valor pH deve usar somente pastilhas PHENOL RED com impressão de película preta, que estão identificadas com o termo PHOTOMETER.

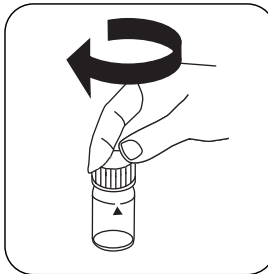


## Realização da determinação Valor pH com pastilha

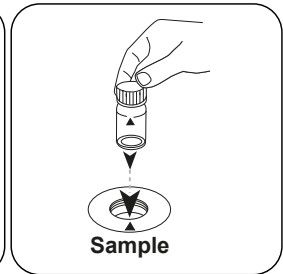
Escolher o método no equipamento.



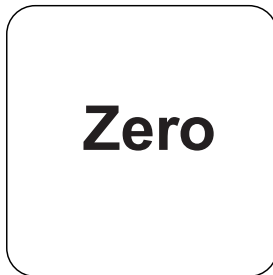
Encher a célula de 24 mm com **10 ml de amostra**.



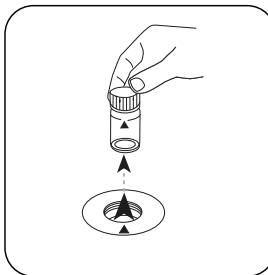
Fechar a(s) célula(s).



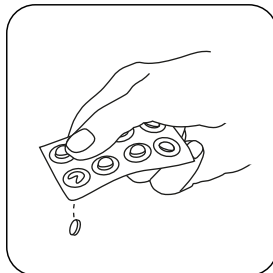
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



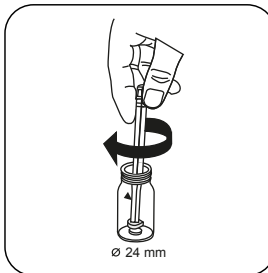
Premir a tecla **ZERO**.



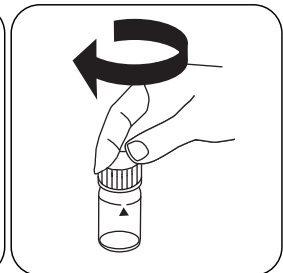
Retirar a célula do compartimento de medição.



**Pastilha PHENOL RED PHOTOMETER.**

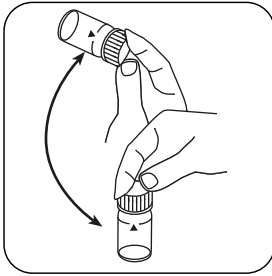


Esmagar a(s) pastilha(s) rodando ligeiramente.

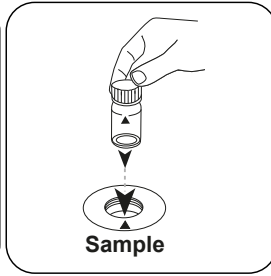


Fechar a(s) célula(s).

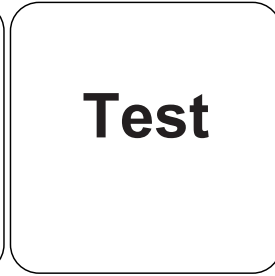




Dissolver a(s) pastilha(s) girando.



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



Premir a tecla **TEST** (XD: **START**).

No visor aparece o resultado como valor pH.

PT

## Método Químico

Phenol Red

## Apêndice

### Texto de Interferências

PT

#### Interferências Persistentes

1. As amostras de água com baixa dureza de carbonato\* podem obter valores pH incorretos.

\* $K_{s4,3} < 0,7$  mmol/l  $\triangleq$  Alcalinidade total < 35 mg/L  $\text{CaCO}_3$ .

#### Interferências Removíveis

1. Os valores pH inferiores a 6,5 e superiores a 8,4 podem causar resultados dentro da área de medição. Recomenda-se um teste de plausibilidade (medidor de pH).
2. Erro de sal:  
No caso de teores de sal até 2 g/L não é expectável nenhum erro de sal significativo devido ao teor de sal da pastilha de reagente. No caso de teores de sal superiores, deve corrigir os valores de medição do seguinte modo:

Teor de sal da amostra emg/L	30 (água do mar)	60	120	180
Correção	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup>segundo Kolthoff (1922)

<sup>2)</sup>segundo Parson e Douglas (1926)

#### Bibliografia

Colorimetric Chemical Analytical Methods, 9th Edition, London



Valor pH L

M331

6.5 - 8.4 pH

PH

Phenol Red

PT

## Material

Material necessário (parcialmente opcional):

Título	Verpackungseinheit	Artigo No
Solução de vermelho fenol	15 mL	471040
Solução de vermelho fenol	100 mL	471041
Solução de vermelho fenol em embalagem de -6	1 pc.	471046

## Preparação

1. Devido aos diferentes tamanhos de gotas, o resultado de medição pode apresentar desvios maiores do que ao utilizar pastilhas.  
Se utilizar uma pipeta (0,18 ml corresponde a 6 gotas) pode reduzir este desvio.

## Notas

1. Depois de usado, o frasco conta-gotas deve ser novamente fechado com a respetiva tampa de enroscar à cor.
2. Guardar o reagente em local fresco entre +6 °C e +10 °C.

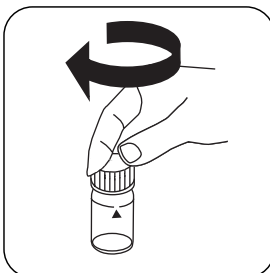


## Realização da determinação Valor pH com reagente líquido

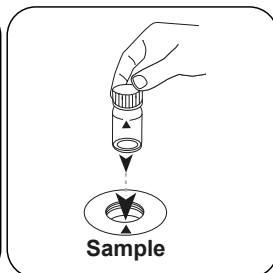
Escolher o método no equipamento.



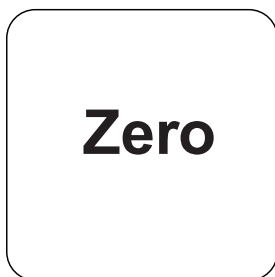
Encher a célula de 24 mm com **10 ml de amostra**.



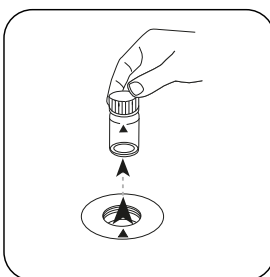
Fechar a(s) célula(s).



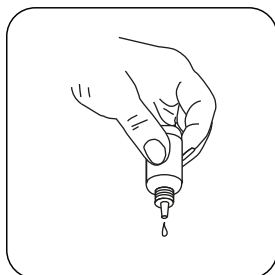
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



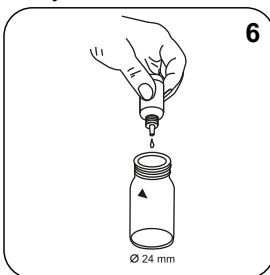
Premir a tecla **ZERO**.



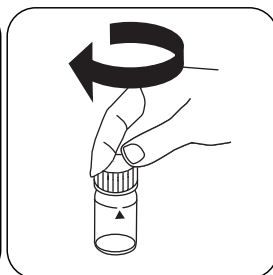
Retirar a célula do compartimento de medição.



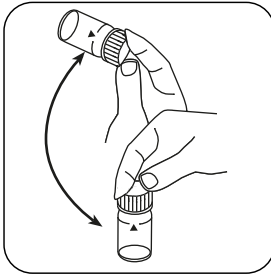
Manter os frascos conta gotas na vertical e pressionar lentamente para adicionar gotas de igual dimensão.



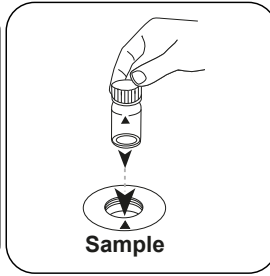
Adicionar **6 gotas PHENOL Red-Lösung**.



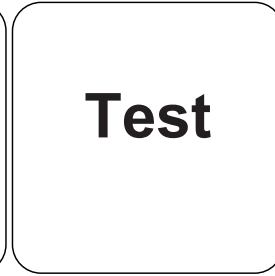
Fechar a(s) célula(s).



Misturar o conteúdo girando.



Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



Premir a tecla **TEST** (XD: **START**).

No visor aparece o resultado como valor pH.

PT

## Método Químico

Phenol Red

## Apêndice

### Texto de Interferências

PT

#### Interferências Removíveis

1. Erro de sal: Correção do valor de medição (valores médios) para amostras com um teor de sal de:


2. Teor de sal da amostra	Correção
30 g/L (água do mar)	-0,15 <sup>1)</sup>
60 g/L	-0,21 <sup>2)</sup>
120 g/L	-0,26 <sup>2)</sup>
180 g/L	-0,29 <sup>2)</sup>
<sup>1)</sup> segundo Kolthoff (1922)	<sup>2)</sup> segundo Parson e Douglas (1926)

3. Na análise de água clorada, o teor de cloro residual existente pode influenciar a reação de cor do reagente líquido. Isto é evitado, na medida em que se insere um pequeno cristal de tiosulfato de sódio ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) na solução de amostra antes de ser adicionada a solução PHENOL RED.

#### Bibliografia

Colorimetric Chemical Analytical Methods, 9th Edition, London

KS4.3 T / 20



**Naam van de methode**

**Nummer methode**

**Streepjescode ter identificatie van de methode**

**Meetbereik**

$K_{S4.3} T$  M20  
0.1 - 4 mmol/l  $K_{S4.3}$  S:4.3  
Zuur / Indicator

**Chemische methode**

**Uitlezing in MD**  
100 MD 110 / MD 200

**Instrument specifieke informatie**

De test kan op de volgende apparaten worden uitgevoerd. Bovendien worden de vereiste cuvette en het absorptiebereik van de fotometer aangegeven.

Toestellen	Cuvet	$\lambda$	Meetbereik
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	$\varnothing$ 24 mm	610 nm	0.1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	$\varnothing$ 24 mm	615 nm	0.1 - 4 mmol/l $K_{S4.3}$

**Reagentia**

Benodigd materiaal (deels optioneel):

Titel	Verpakkingseenheid	Bestelnr.
Alka-M-Photometer	Tablet / 100	513210BT
Alka-M-Photometer	Tablet / 250	513211BT

**Toepassingsbereik**

- Afvalwaterzuivering
- Behandeling drinkwater
- Zuivering vervuild water

**Aantekeningen**

1. De termen alkaliteit-m, m-waarde, totale alkaliteit en zuurcapaciteit $_{K_{S4.3}}$  zijn identiek.
2. De exacte naleving van het monstervolume van 10 ml is bepalend voor de nauwkeurigheid van het analyseresultaat.

**Beknopte naam conform de norm ISO 639-1**

**Herziene versie**

NL Handboek van Methoden 01/20

**Uitvoering van de meting**

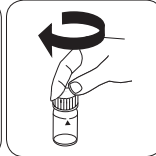
**Uitvoering van de bepaling Zuurcapaciteit  $K_{s4,3}$  met tablet**

De methode in het apparaat selecteren.

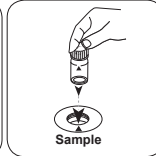
Voor deze methode moet bij de volgende apparaten geen nulmeting worden uitgevoerd:  
XD 7000, XD 7500



Spoelbakje van 24 mm met **10 ml** staal vullen.

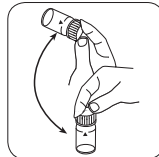


De spoelbakjes afsluiten.

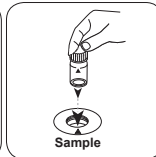


Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letten.

• • •



Tabletten oplossen door om te draaien



Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letten.



De toets **TEST** (XD: **START**) indrukken.

De display toont het resultaat als Zuurcapaciteit  $K_{s4,3}$ .



**Chloor T****M100****0.01 - 6.0 mg/L Cl<sub>2</sub><sup>a)</sup>****CL6****DPD**

NL

**Reagentia**

Benodigd materiaal (deels optioneel):

<b>Omschrijving</b>	<b>Verpackungseinheit</b>		<b>Bestelnr.</b>
DPD Nr. 1	Tablet / 100		511050BT
DPD Nr. 1	Tablet / 250		511051BT
DPD Nr. 1	Tablet / 500		511052BT
DPD Nr. 3	Tablet / 100		511080BT
DPD Nr. 3	Tablet / 250		511081BT
DPD Nr. 3	Tablet / 500		511082BT
DPD Nr. 1 hoog calcium <sup>e)</sup>	Tablet / 100		515740BT
DPD Nr. 1 hoog calcium <sup>e)</sup>	Tablet / 250		515741BT
DPD Nr. 1 hoog calcium <sup>e)</sup>	Tablet / 500		515742BT
DPD Nr. 3 hoog calcium <sup>e)</sup>	Tablet / 100		515730BT
DPD Nr. 3 hoog calcium <sup>e)</sup>	Tablet / 250		515731BT
DPD Nr. 3 hoog calcium <sup>e)</sup>	Tablet / 500		515732BT
DPD Nr. 4	Tablet / 100		511220BT
DPD Nr. 4	Tablet / 250		511221BT
DPD Nr. 4	Tablet / 500		511222BT
DPD Nr. 3 EVO	Tablet / 100		511420BT
DPD Nr. 3 EVO	Tablet / 250		511421BT
DPD Nr. 3 EVO	Tablet / 500		511422BT
DPD Nr. 4 EVO	Tablet / 100		511970BT
DPD Nr. 4 EVO	Tablet / 250		511971BT
DPD Nr. 4 EVO	Tablet / 500		511972BT
Navulverpakking Suba II	1 St.		525600

**Beschikbare standaarden**

<b>Title</b>	<b>Verpackungseinheit</b>	<b>Bestelnr.</b>
ValidCheck Chloor 1,5 mg/l	1 St.	48105510



## Bemonstering

1. Tijdens de monstervoorbereiding moet worden vermeden dat het chloor wordt uitgestoten, bijvoorbeeld door pipetteren en schudden.
2. De analyse moet onmiddellijk na de bemonstering worden uitgevoerd.

## Voorbereiding

1. Het schoonmaken van de spoelbakjes:  
Aangezien veel huishoudelijke reinigingsmiddelen (bijv. afwasmiddelen) minder schadelijke stoffen bevatten, kan de bepaling van chloor leiden tot minder goede resultaten. Om deze meetfout uit te sluiten, moeten de glasapparaten chloorvrij zijn. Hiertoe wordt het glaswerk gedurende één uur onder natriumhypochlorietoplossing (0,1 g/L) bewaard en vervolgens grondig gespoeld met gedeïoniseerd water.
2. Voor de individuele bepaling van vrij chloor en totaal chloor is het zinvol om een aparte set spoelbakjes te gebruiken (zie EN ISO 7393-2, paragraaf 5.3).
3. De DPD-kleurontwikkeling vindt plaats bij een pH-waarde van 6,2 tot 6,5. De reagentia bevatten daarom een buffer voor de aanpassing van de pH-waarde. Sterk alkalisch of zuur water moet echter vóór de analyse in een pH-gebied tussen 6 en 7 (met 0,5 mol/l-zwavelzuur of 1 mol/l-natriumhydroxideoplossing) worden geplatest.

## Aantekeningen

1. EVO-tabletten kunnen worden gebruikt als alternatief voor de overeenkomstige standaardtabletten (bv. DPD nr. 3 EVO in plaats van DPD nr. 3).

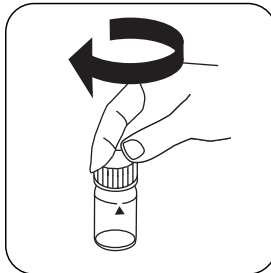


## Uitvoering van de bepaling vrij chloor met tablet

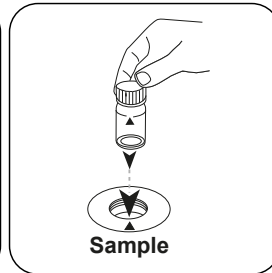
De methode in het apparaat selecteren.  
Selecteer bovendien de bepaling: vrij



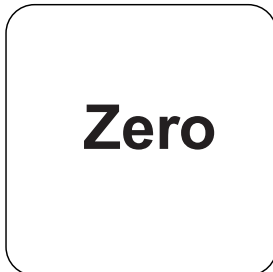
Spoelbakje van 24 mm met  
**10 ml staal** vullen.



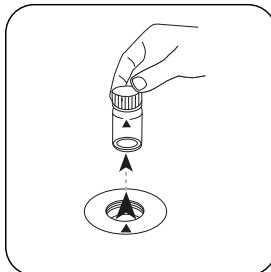
De spoelbakjes afsluiten.



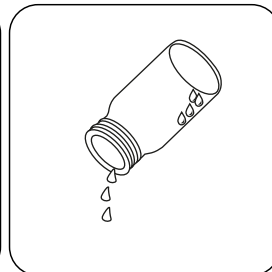
Het **staalspoelbakje** in de  
meetschacht plaatsen. Op  
de positionering letten.



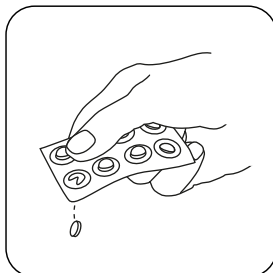
De toets **NUL** indrukken.



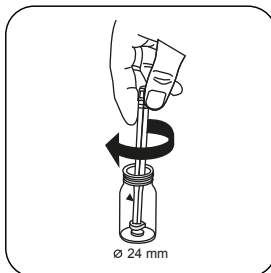
Het spoelbakje uit de  
meetschacht nemen.



Het spoelbakje tot op  
enkele druppels ledigen.



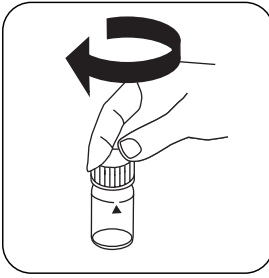
Een **DPD Nr. 1 tablet**  
toevoegen.



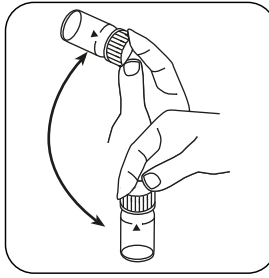
De tabletten onder lichte  
rotatie verpletteren.



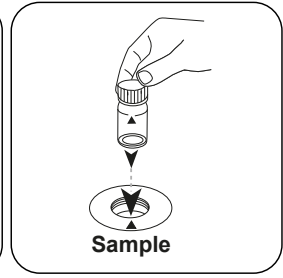
Het spoelbakje tot aan de  
**markering van 10 ml** met  
het **staal** vullen.



De spoelbakjes afsluiten.



Tabletten oplossen door om te draaien



Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letteren.

NL

## Test

De toets **TEST** (XD: **START**) indrukken.

De display toont het resultaat in mg/l vrij chloor.

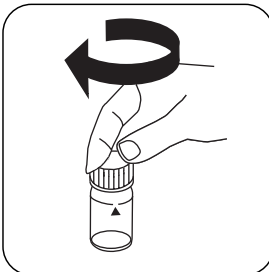
### Uitvoering van de bepaling totaal chloor met tablet

De methode in het apparaat selecteren.

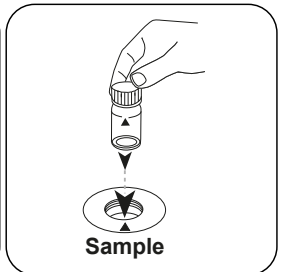
Selecteer bovendien de bepaling: totaal



Spoelbakje van 24 mm met **10 ml** staal vullen.



De spoelbakjes afsluiten.



Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letteren.

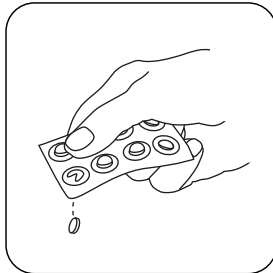


# Zero

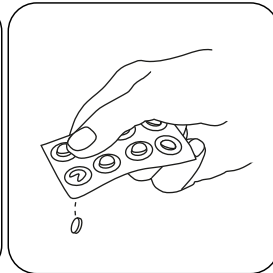
De toets **NUL** indrukken.

Het spoelbakje uit de meetschacht nemen.

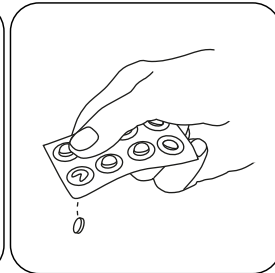
Het spoelbakje tot op enkele druppels ledigen.



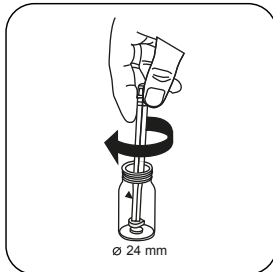
Een DPD Nr. 1 tablet toevoegen.



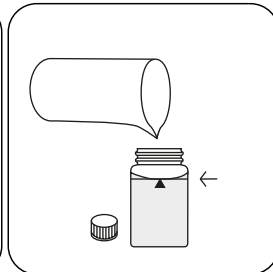
Een DPD Nr. 3 tablet toevoegen.



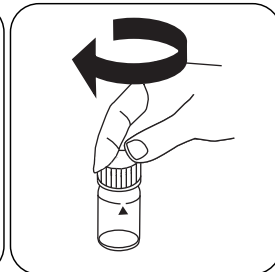
Als alternatief voor DPD nr. 1 en nr. 3 tabletten kan 1 DPD nr. 4 tablet worden toegevoegd.



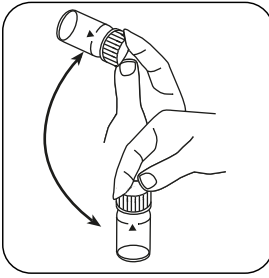
De tabletten onder lichte rotatie verpletteren.



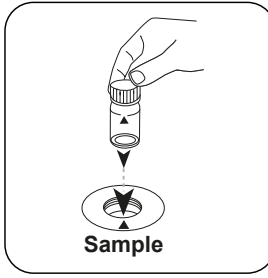
Het spoelbakje tot aan de **markering van 10 ml** met het **staal** vullen.



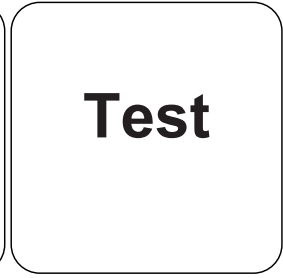
De spoelbakjes afsluiten.



Tabletten oplossen door om te draaien

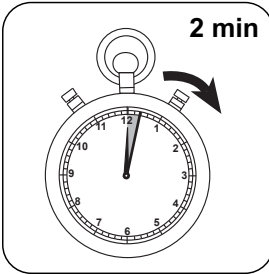


Het **staalspoelbakje** in de meetschacht plaats. Op de positionering letten.



De toets **TEST** (XD: **START**) indrukken.

NL



De reactietijd van **2 minuten** afwachten.

Na afloop van de reactietijd wordt de meting automatisch uitgevoerd. De display toont het resultaat in mg/l Totaal chloor.



## Chemische methode

DPD

## Aanhangsel

NL

## Verstoringsen

### Permanente verstoringen

- Alle oxidatiemiddelen in de monsters reageren als chloor, wat tot extra resultaten leidt.

### Uit te sluiten verstoringen

- Storingen veroorzaakt door koper en ijzer(III) worden door EDTA geëlimineerd.
- Bij monsters met een hoog calciumgehalte\* en/of een hoge geleidbaarheid\* kan het gebruik van reagenstabletten leiden tot vertroebeling van het monster en de daarmee samenhangende onjuiste meting. In dit geval zijn de reagenstabletten DPD-nr. 1 High Calcium en het reagenstablet DPD-nr. 3 High Calcium te gebruiken.  
\*exacte waarden kunnen niet worden gegeven omdat de troebelheidsvorming afhankelijk is van de aard en samenstelling van het monsterwater.
- Concentraties van meer dan 10 mg/L chloor, bij gebruik van tabletten, kunnen leiden tot resultaten binnen het meetbereik tot 0 mg/L. Als de chloorconcentratie te hoog is, moet het monster worden verdund met chloorvrij water. Voeg reagens toe aan 10 ml van het verdunde monster en herhaal de meting (plausibiliteitstest).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0.01
MnO <sub>2</sub>	0.01

## Validatie van de methodes

<b>Aantoonbaarheidsgrens</b>	0.02 mg/L
<b>Bepaalbaarheidsgrens</b>	0.06 mg/L
<b>Einde meetbereik</b>	6 mg/L
<b>Gevoeligheid</b>	2.05 mg/L / Abs
<b>Betrouwbaarheidsgrenzen</b>	0.04 mg/L
<b>Standaardafwijking procedure</b>	0.019 mg/L
<b>Variatiecoëfficiënt procedure</b>	0.87 %

### Conform

EN ISO 7393-2



<sup>a)</sup> bepaling van de vrije, gebonden, totaal mogelijke | <sup>a)</sup> hulpreagens, alternatief voor DPD-nr. 1 / nr. 3 in geval van troebelheid van het monster als gevolg van een hoog calciumionengehalte en/of een hoge geleidbaarheid





Chloor L

M101

0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>

CL6

DPD

NL

## Reagentia

Benodigd materiaal (deels optioneel):

Omschrijving	Verpackungseinheit	Bestelnr.
DPD 1 bufferoplossing, blauw flesje	15 mL	471010
DPD 1-bufferoplossing	100 mL	471011
DPD 1 bufferoplossing in verpakking van 6 stuks	1 St.	471016
DPD 1 reagensoplossing, groen flesje	15 mL	471020
DPD 1-reagensoplossing	100 mL	471021
DPD 1 reagensoplossing in verpakking van 6 stuks	1 St.	471026
DPD 3 oplossing, rood flesje	15 mL	471030
DPD 3 oplossing	100 mL	471031
DPD 3 oplossing in verpakking van 6 stuks	1 St.	471036
DPD reagentia set	1 St.	471056

## Beschikbare standaarden

Title	Verpackungseinheit	Bestelnr.
ValidCheck Chloor 1,5 mg/l	1 St.	48105510

## Bemonstering

- Tijdens de monstervoorbereiding moet worden vermeden dat het chloor wordt uitgestoten, bijvoorbeeld door pipetteren en schudden.
- De analyse moet onmiddellijk na de bemonstering worden uitgevoerd.

## Vorbereiding

1. Het schoonmaken van de spoelbakjes:  
Aangezien veel huishoudelijke reinigingsmiddelen (bijv. afwasmiddelen) minder schadelijke stoffen bevatten, kan de bepaling van chloor leiden tot minder goede resultaten. Om deze meetfout uit te sluiten, moeten de glasapparaten chloorvrij zijn. Hiertoe wordt het glaswerk gedurende één uur onder natriumhypochlorietoplossing (0,1 g/L) bewaard en vervolgens grondig gespoeld met gedeïoniseerd water.
2. Voor de individuele bepaling van vrij chloor en totaal chloor is het zinvol om een aparte set spoelbakjes te gebruiken (zie EN ISO 7393-2, paragraaf 5.3).
3. De DPD-kleurontwikkeling vindt plaats bij een pH-waarde van 6,2 tot 6,5. De reagentia bevatten daarom een buffer voor de aanpassing van de pH-waarde. Sterk alkalisch of zuur water moet echter vóór de analyse in een pH-gebied tussen 6 en 7 (met 0,5 mol/l-zwavelzuur of 1 mol/l-natriumhydroxideoplossing) worden geplaatst.

## Aantekeningen

1. Na gebruik moeten de druppelflacons onmiddellijk worden gesloten met de schroefdop van dezelfde kleur.
2. Bewaar het reagens ingesteld op +6 °C tot +10 °C op een koele plaats.

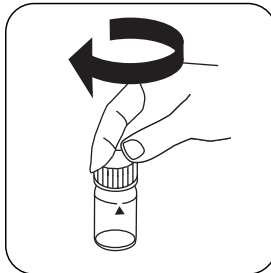


## Uitvoering van de bepaling vrij chloor met vloeibaar reagens

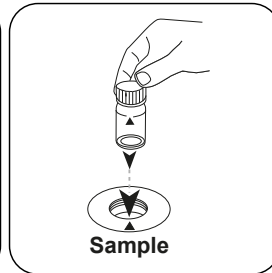
De methode in het apparaat selecteren.  
Selecteer bovendien de bepaling: vrij



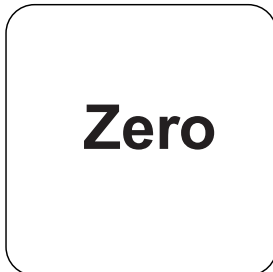
Spoelbakje van 24 mm met  
**10 ml staal** vullen.



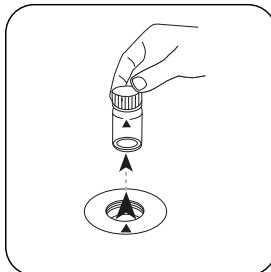
De spoelbakjes afsluiten.



Het **staalspoelbakje** in de  
meetschacht plaatsen. Op  
de positionering letten.



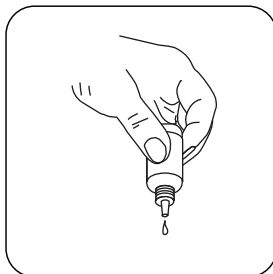
De toets **NUL** indrukken.



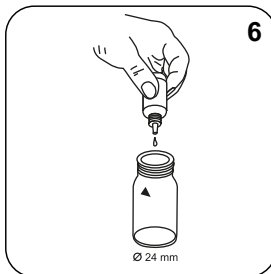
Het spoelbakje uit de  
meetschacht nemen.



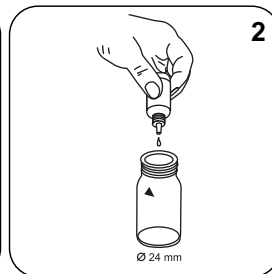
Het spoelbakje ledigen.



De druppelflessen verticaal  
houden en even grote  
druppels toevoegen door  
langzaam te drukken.



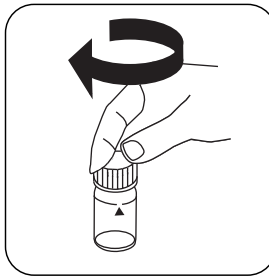
**6 druppels DPD**  
**1 bufferoplossing**  
toevoegen.



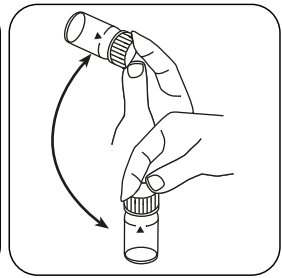
**2 druppels DPD**  
**1 reagensoplossing**  
toevoegen.



Het spoelbakje tot aan de **markering van 10 ml** met het **staal** vullen.

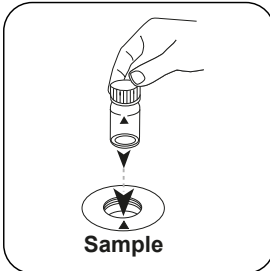


De spoelbakjes afsluiten.



De inhoud mengen door om te draaien.

NL



Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letten.  
De display toont het resultaat in mg/l vrij chloor.

De toets **TEST** (XD: **START**) indrukken.

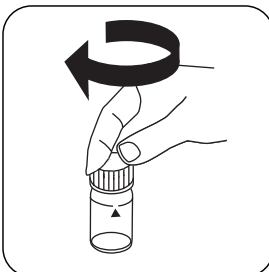
# Test

## Uitvoering van de bepaling totaal chloor met vloeibaar reagens

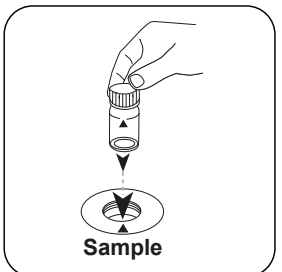
De methode in het apparaat selecteren.  
Selecteer bovendien de bepaling: totaal



Spoelbakje van 24 mm met **10 ml staal** vullen.



De spoelbakjes afsluiten.

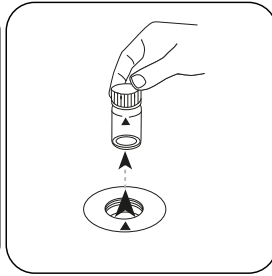


Het **staal**spoelbakje in de meetschacht plaatsen. Op de positionering letten.

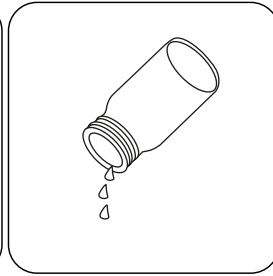


# Zero

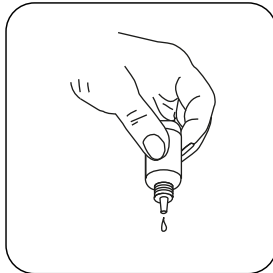
De toets **NUL** indrukken.



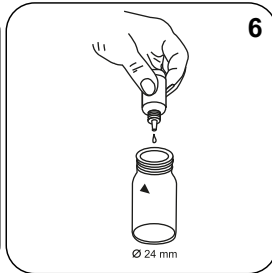
Het spoelbakje uit de meetschacht nemen.



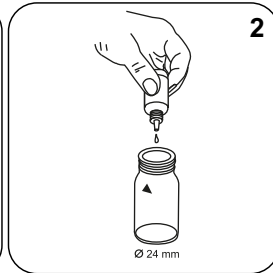
Het spoelbakje ledigen.



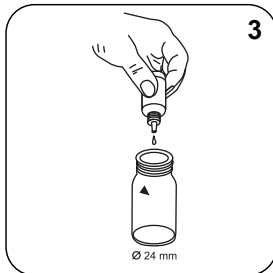
De druppelflessen verticaal houden en even grote druppels toevoegen door langzaam te drukken.



**6 druppels DPD**  
**1 bufferoplossing**  
toevoegen.



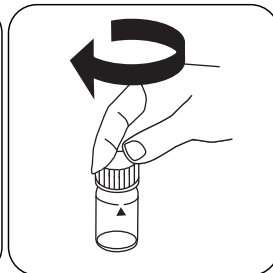
**2 druppels DPD**  
**1 reagensoplossing**  
toevoegen.



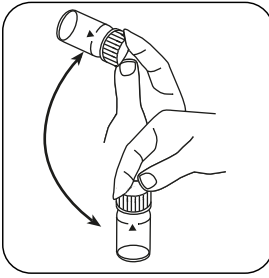
**3 druppels DPD**  
**3 oplossing** toevoegen.



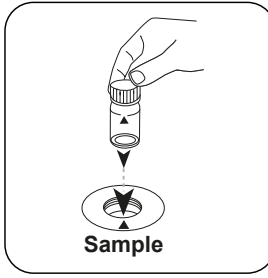
Het spoelbakje tot aan de **markering van 10 ml** met het **staal** vullen.



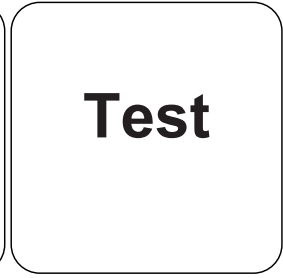
De spoelbakjes afsluiten.



De inhoud mengen door om te draaien.

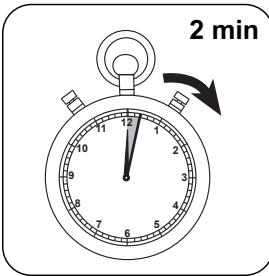


Het **staalspoelbakje** in de meetschacht plaats. Op de positionering letten.



De toets **TEST** (XD: **START**) indrukken.

NL



De reactietijd van **2 minuten** afwachten.

Na afloop van de reactietijd wordt de meting automatisch uitgevoerd. De display toont het resultaat in mg/l Totaal chloor.



## Chemische methode

DPD

## Aanhangsel

NL

## Verstoringen

### Permanente verstoringen

- Alle oxidatiemiddelen in de monsters reageren als chloor, wat tot extra resultaten leidt.

### Uit te sluiten verstoringen

- Storingen veroorzaakt door koper en ijzer(III) worden door EDTA geëlimineerd.
- Concentraties van meer dan 4 mg/L chloor, bij gebruik van vloeibare reagentia, kunnen leiden tot resultaten binnen het meetbereik tot 0 mg/L. In dit geval moet het monster worden verdund met chloorvrij water. Voeg reagens toe aan 10 ml van het verdunde monster en herhaal de meting (plausibiliteitstest).

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0,01
MnO <sub>2</sub>	0,01

### Conform

EN ISO 7393-2

<sup>a)</sup> bepaling van de vrije, gebonden, totaal mogelijke







pH-waarde T

M330

6.5 - 8.4 pH

PH

Fenolrood

NL

## Reagentia

Benodigd materiaal (deels optioneel):

Omschrijving	VerpackungseinheitBestelnr.	
Fenolrood fotometer	Tablet / 100	511770BT
Fenolrood fotometer	Tablet / 250	511771BT
Fenolrood fotometer	Tablet / 500	511772BT

## Aantekeningen

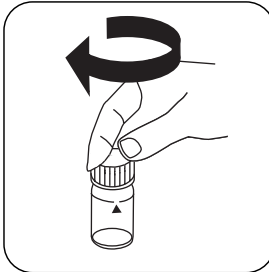
1. Voor de fotometrische pH-bepaling mogen alleen PHENOL RED-tabletten met een zwarte foliedruk en de term PHOTOMETER worden gebruikt.

## Uitvoering van de bepaling pH-waarde met tablet

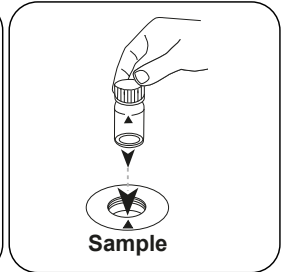
De methode in het apparaat selecteren.



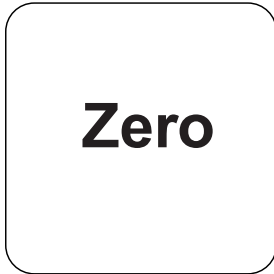
Spoelbakje van 24 mm met  
**10 ml** staal vullen.



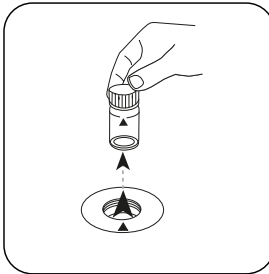
De spoelbakjes afsluiten.



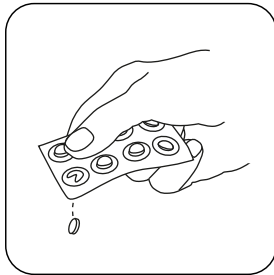
Het **staalspoelbakje** in de  
meetschacht plaatsen. Op  
de positionering letten.



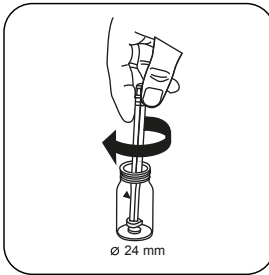
De toets **NUL** indrukken.



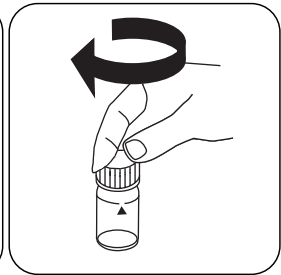
Het spoelbakje uit de  
meetschacht nemen.



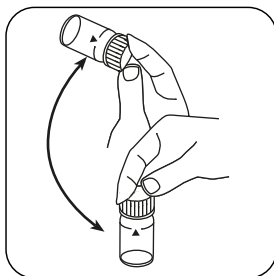
Een **FENOLROOD**  
**FOTOMETER** tablet  
toevoegen.



De tabletten onder lichte  
rotatie verpletteren.

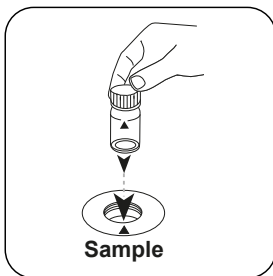


De spoelbakjes afsluiten.

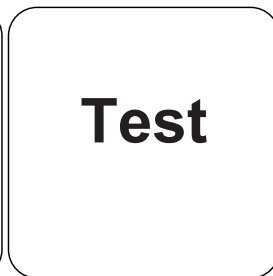


Tabletten oplossen door om te draaien

De display toont het resultaat als pH-waarde.



Het **staalpoelbakje** in de meetschacht plaatsen. Op de positionering letten.



De toets **TEST** (XD: **START**) indrukken.

NL

## Chemische methode

Fenolrood

## Aanhangsel

### Verstoringsen

NL

#### Permanente verstoringen

1. Watermonsters met een lage carbonaathardheid\* kunnen leiden tot onjuiste pH-waarden.

\*  $K_{S4,3} < 0,7 \text{ mmol/l} \triangleq \text{Totale alkaliteit} < 35 \text{ mg/L CaCO}_3$ .

#### Uit te sluiten verstoringen

1. pH-waarden onder 6,5 en boven 8,4 kunnen leiden tot resultaten binnen het meetbereik. Een plausibiliteitstest (pH-meter) wordt aanbevolen.
2. Zoutgebrek:  
Voor zoutgehalten tot 2 g/L kan geen significante zoutfout worden verwacht als gevolg van het zoutgehalte van het reagenstablet. Indien het zoutgehalte hoger is, worden de gemeten waarden als volgt gecorrigeerd:

zoutgehalte van het monster (in g/L)	30 (zeewater)	60	120	180
Correctie	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup> na Kolthoff (1922)

<sup>2)</sup> na Parson en Douglas (1926)

#### Literatuurverwijzing

Colorimetric Chemical Analytical Methods, 9th Edition, London



pH-waarde L

M331

6.5 - 8.4 pH

PH

Fenolrood

NL

## Reagentia

Benodigd materiaal (deels optioneel):

Omschrijving	Verpackungseinheit	Bestelnr.
Fenolrood oplossing	15 mL	471040
Fenolrood oplossing	100 mL	471041
Fenolrood oplossing in verpakking van 6 stuks	1 St.	471046

## Vorbereitung

1. Door de verschillende druppelgroottes kan het meetresultaat grotere afwijkingen vertonen dan bij gebruik van tabletten.  
Bij gebruik van een pipet (0,18 ml komt overeen met 6 druppels) kan deze afwijking worden geminimaliseerd.

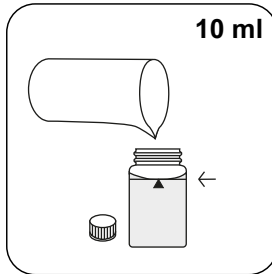
## Aantekeningen

1. Na gebruik moet de druppelfles meteen onmiddellijk worden gesloten met de schroefdop van dezelfde kleur.
2. Bewaar het reagens bij +6 °C tot +10 °C op een koele plaats.

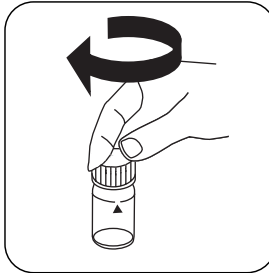


## Uitvoering van de bepaling pH-waarde met vloeibaar reagens

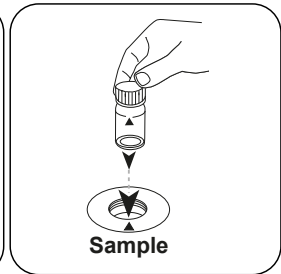
De methode in het apparaat selecteren.



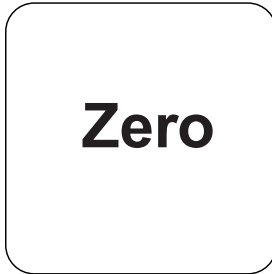
Spoelbakje van 24 mm met **10 ml staal** vullen.



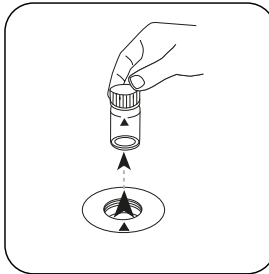
De spoelbakjes afsluiten.



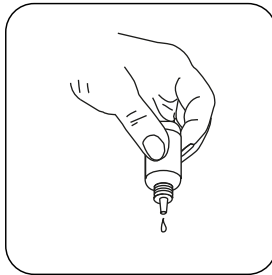
Het **staal** spoelbakje in de meetschacht plaatsen. Op de positionering letten.



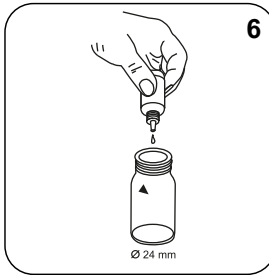
De toets **NUL** indrukken.



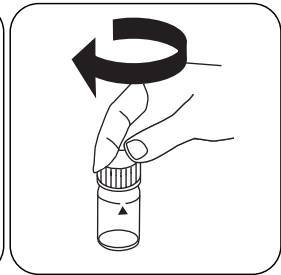
Het spoelbakje uit de meetschacht nemen.



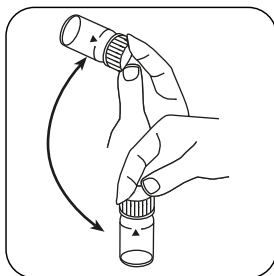
De druppelflessen verticaal houden en even grote druppels toevoegen door langzaam te drukken.



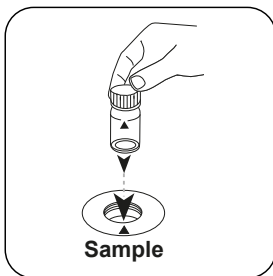
**6 druppels FENOLROOD-oplossing** toevoegen.



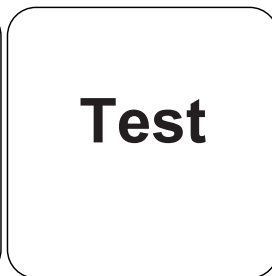
De spoelbakjes afsluiten.



De inhoud mengen door om te draaien.



Het **staalpoelbakje** in de meetschacht plaatsen. Op de positionering letten.



# Test

De toets **TEST** (XD: **START**) indrukken.

De display toont het resultaat als pH-waarde.

NL

## Chemische methode

Fenolrood

## Aanhangsel

### Verstoringsen

NL

#### Uit te sluiten verstoringen

1. Zoutgebrek: correctie van de gemeten waarde (gemiddelde waarden) voor monsters met een zoutgehalte van:

2.	Zoutgehalte van het monster	Correctie
	30 g/L (zeewater)	-0,15 <sup>1)</sup>
	60 g/L	-0,21 <sup>2)</sup>
	120 g/L	-0,26 <sup>2)</sup>
	180 g/L	-0,29 <sup>2)</sup>
	<sup>1)</sup> na Kolthoff (1922)	<sup>2)</sup> na Parson en Douglas (1926)


3. Bij het testen van gechloreerd water kan het aanwezige chloorgehalte de kleurreactie van het vloeibare reagens beïnvloeden. Dit wordt voorkomen door een klein kristal natriumthiosulfaat ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) aan de monsteroplossing toe te voegen voordat de PHENOL RED-oplossing wordt toegevoegd.

#### Literatuurverwijzing

Colorimetric Chemical Analytical Methods, 9th Edition, London



KS4.3 T / 20



方法名称

方法号

用于方法检测的条形码

测量范围

仪器具体信息

化学方法

屏幕显示: MD 100 / MD 110 / MD 200

**仪器具体信息**

测试可以在以下设备上执行。此外还指出了所需的比色杯和光度计的吸光范围。

仪器类型	比色皿	$\lambda$	测量范围
MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630	$\varnothing$ 24 mm	610 nm	0.1 - 4 mmol/l $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500	$\varnothing$ 24 mm	615 nm	0.1 - 4 mmol/l $K_{S4.3}$

**材料**

所需材料 (部分可选) :

标题	包装单位	货号
Alka-M-Photometer	片剂 / 100	513210BT
Alka-M-Photometer	片剂 / 250	513211BT

**应用列表**

- 污水处理
- 饮用水处理
- 原水处理

**备注**

1. 术语碱度-m、m-值、总碱度和酸容量  $K_{S4.3}$  是相同的。
2. 准确地遵守 10 ml 的样本体积对分析结果的准确度至关重要。

语言代码ISO 639-1

修订状态

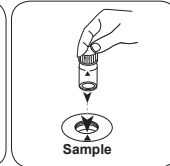
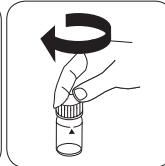
CN 方法手册 01/20

开始测量

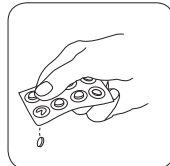
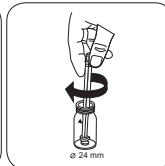
进行测定  $K_{s4.3}$  片剂酸容量

选择设备中的方法。

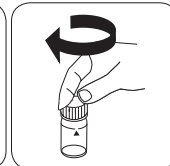
对于这种方法，在以下设备上不能进行 ZERO 测量：XD 7000, XD 7500

用 10 ml 样本填充 24 mm 比密封比色杯。  
色杯。将样本比色杯放入测量轴  
中。注意定位。

• • •

加入 ALKA-M-PHOTOME-  
TER 片剂。

用轻微的扭转压碎片剂。



密封比色杯。

CN 方法手册 01/20

ZH



T 氯

M100

0.01 - 6.0 mg/L Cl<sub>2</sub><sup>a)</sup>

CL6

DPD

## 材料

ZH

所需材料 ( 部分可選 ) :

标题	Verpackungseinheit 货号	
DPD No.1	片剂 / 100	511050BT
DPD No.1	片剂 / 250	511051BT
DPD No.1	片剂 / 500	511052BT
DPD No.3	片剂 / 100	511080BT
DPD No.3	片剂 / 250	511081BT
DPD No.3	片剂 / 500	511082BT
DPD No.1 高钙 <sup>e)</sup>	片剂 / 100	515740BT
DPD No.1 高钙 <sup>e)</sup>	片剂 / 250	515741BT
DPD No.1 高钙 <sup>e)</sup>	片剂 / 500	515742BT
DPD No.3 高钙 <sup>e)</sup>	片剂 / 100	515730BT
DPD No.3 高钙 <sup>e)</sup>	片剂 / 250	515731BT
DPD No.3 高钙 <sup>e)</sup>	片剂 / 500	515732BT
DPD No.4	片剂 / 100	511220BT
DPD No.4	片剂 / 250	511221BT
DPD No.4	片剂 / 500	511222BT
DPD No.3 EVO	片剂 / 100	511420BT
DPD No.3 EVO	片剂 / 250	511421BT
DPD No.3 EVO	片剂 / 500	511422BT
DPD No.4 EVO	片剂 / 100	511970BT
DPD No.4 EVO	片剂 / 250	511971BT
DPD No.4 EVO	片剂 / 500	511972BT
补充包 Suba II	1 片	525600

## 現有標準

Title	Verpackungseinheit	货号
ValidCheck 氯 1.5 mg/l	1 片	48105510



## 取样

1. 在样本制备中，通过移液和摇动来避免氯的排气。
2. 取样后必须立即进行分析。

## 准备

1. 清洗比色杯：  
由于许多家用清洁剂（例如洗碗用洗涤剂）含有还原剂，所以测定的氯结果可能会不足。为了排除这种测量误差，玻璃器皿应无氯。为此，将玻璃器皿在次氯酸钠溶液（0.1 g/L）下存放 1 小时，然后用去离子水（软化水）彻底冲洗。
2. 对于游离氯和总氯的单独测定，使用一套相应单独的比色杯是有意义的（参见 EN ISO 7393-2，第 5.3 段）。
3. DPD 显色发生在 pH 值在 6.2 至 6.5 时。因此该试剂含有用于调节 pH 值的缓冲液。但在分析前（用 0.5 mol/l 硫酸或 1 mol/l 氢氧化钠溶液）必须将强碱性或酸性水的 pH 范围调节到 6 和 7 之间。

## 备注

1. EVO 片剂可以作为相应标准片剂的替代品（如 DPD No.3 EVO 代替 DPD No.3）。



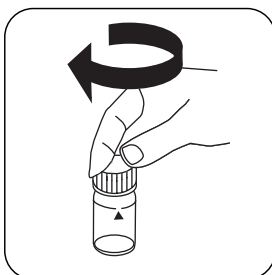
## 进行测定 余氯 片剂法

选择设备中的方法。  
另外选择测定：余氯

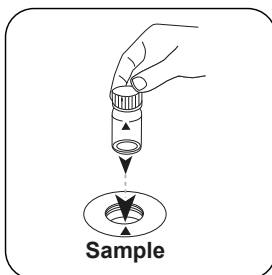
ZH



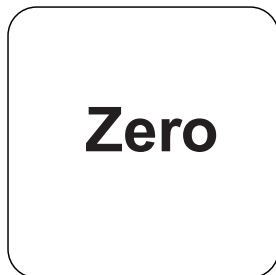
用 **10 ml** 样本填充 24 mm 比色杯。



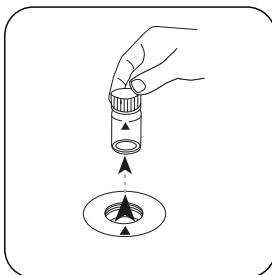
密封比色杯。



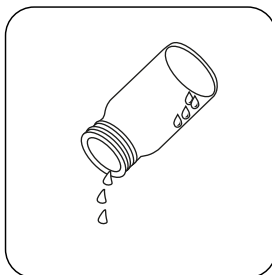
将样本比色杯放入测量轴中。注意定位。



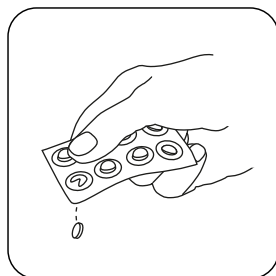
按下 **ZERO** 按钮。



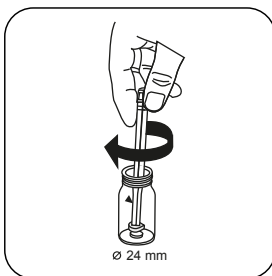
从测量轴上取下比色杯。



将比色杯倒空。



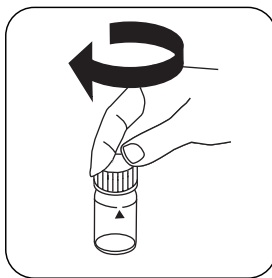
加入 **DPD No. 1** 片剂。



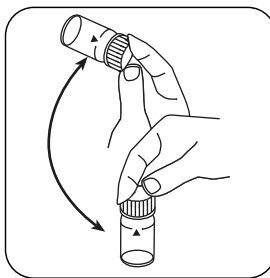
用轻微的扭转压碎片剂。



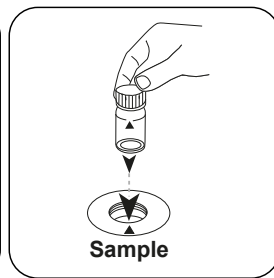
用样本将比色杯填充至 **10 ml** 刻度处。



密封比色杯。



通过旋转溶解片剂。



将样本比色杯放入测量轴中。注意定位。

ZH

## Test

按下 **TEST (XD: START)** 按钮。

结果在显示屏上显示为 mg / l 余氯。

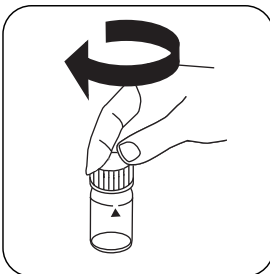
### 进行测定 总氯 片剂法

选择设备中的方法。

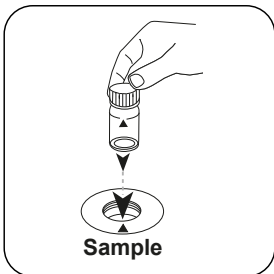
另外选择测定：总氯



用 **10 ml** 样本填充 24 mm 比色杯。



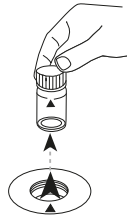
密封比色杯。



将样本比色杯放入测量轴中。注意定位。



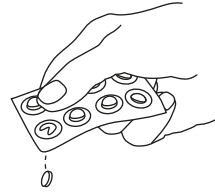
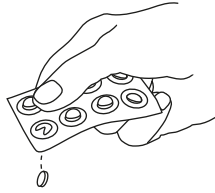
# Zero



按下 **ZERO** 按钮。

从测量轴上取下比色杯。

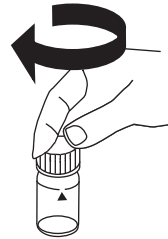
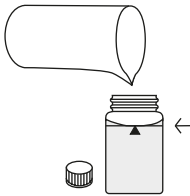
将比色杯倒空。



加入 **DPD No. 1** 片剂。

加入 **DPD No. 3** 片剂。

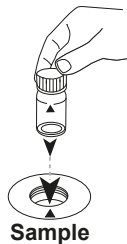
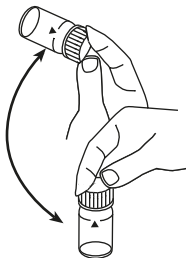
作为 DPD 1号和3号片剂的替代品，可以添加1个DPD 4号片剂。



用轻微的扭转压碎片剂。

用样本将比色杯填充至 **10 ml** 刻度处。

密封比色杯。

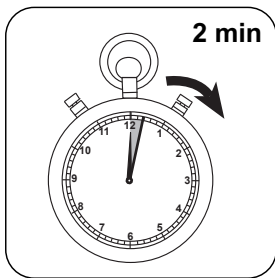


# Test

通过旋转溶解片剂。

将样本比色杯放入测量轴中。注意定位。

按下 **TEST (XD: START)** 按钮。



等待 2 分钟反应时间。  
反应时间结束后，自动进行测量。  
结果在显示屏上显示为 mg / l 总氯。

ZH





## 化学方法

DPD

## 附录

ZH

### 干扰说明

#### 持续干扰

- 存在于样本中的所有氧化剂都像氯一样反应，导致多重结果。

#### 可消除干扰

- 铜和铁 ( III ) 的干扰必须通过 EDTA 消除。
- 对于高钙含量\*和/或高电导率\*的样本，使用试剂片可能会导致样本浑浊和相关的测量误差。在这种情况下，可选用试剂片 DPD 编号1 高钙和试剂片 DPD 编号3 高钙。  
\*不能给出精确值，因为浑浊的形成取决于样本水的类型和组成。
- 在使用片剂时，高于 10 mg/L 氯的浓度可导致测量范围内的结果高达 0 mg/L。氯浓度过高时应用无氯水稀释样本。将 10 ml 稀释的样本与试剂混合并重复测量 ( 可信度测试 )。

1. Interferences	1. Interferes from
$\text{CrO}_4^{2-}$	0.01
$\text{MnO}_2$	0.01

### 方法验证

检出限	0.02 mg/L
测定下限	0.06 mg/L
测量上限	6 mg/L
灵敏度	2.05 mg/L / Abs
置信范围	0.04 mg/L
标准偏差	0.019 mg/L
变异系数	0.87 %

#### 一致性

EN ISO 7393-2

<sup>a)</sup> 测定余氯，总氯和结合氯 |<sup>o</sup> 替代试剂，取代 DPD No.1/No.3 试剂，用于由高浓度钙离子和/或高电导率引起的浑水样分析





L 氯

M101

0.02 - 4.0 mg/L Cl<sub>2</sub><sup>a)</sup>

CL6

DPD

## 材料

ZH

所需材料 ( 部分可選 ) :

标题	Verpackungseinheit 货号	
DPD 1 缓冲溶液, 蓝瓶	15 mL	471010
DPD 1 缓冲溶液	100 mL	471011
DPD 1 缓冲溶液, 6 件装	1 片	471016
DPD 1 试剂溶液, 绿瓶	15 mL	471020
DPD 1 试剂溶液	100 mL	471021
DPD 1 试剂溶液, 6 件装	1 片	471026
DPD 3 溶液, 红瓶	15 mL	471030
DPD 3 溶液	100 mL	471031
DPD 3 溶液, 6 件装	1 片	471036
DPD 试剂套件	1 片	471056

## 現有標準

Title	Verpackungseinheit	货号
ValidCheck 氯 1.5 mg/l	1 片	48105510

## 取样

1. 在样本制备中, 通过移液和摇动来避免氯的排气。
2. 取样后必须立即进行分析。

## 准备

1. 清洗比色杯：  
由于许多家用清洁剂（例如洗碗用洗涤剂）含有还原剂，所以测定的氯结果可能会不足。为了排除这种测量误差，玻璃器皿应无氯。为此，将玻璃器皿在次氯酸钠溶液（0.1 g/L）下存放 1 小时，然后用去离子水（软化水）彻底冲洗。
2. 对于游离氯和总氯的单独测定，使用一套相应单独的比色杯是有意义的（参见 EN ISO 7393-2，第 5.3 段）。
3. DPD 显色发生在 pH 值在 6.2 至 6.5 时。因此该试剂含有用于调节 pH 值的缓冲液。但在分析前（用 0.5 mol/l 硫酸或 1 mol/l 氢氧化钠溶液）必须将强碱性或酸性水的 pH 范围调节到 6 和 7 之间。

ZH

## 备注

1. 使用后滴瓶必须立即用相同颜色的瓶盖重新密封。
2. 将试剂盒冷藏在 +6 °C 至 +10 °C。



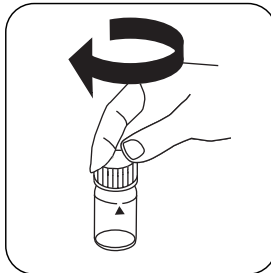
## 进行测定 余氯 水剂法

选择设备中的方法。  
另外选择测定：余氯

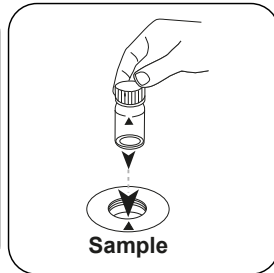
ZH



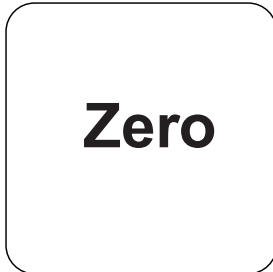
用 10 ml 样本填充 24 mm 比色杯。



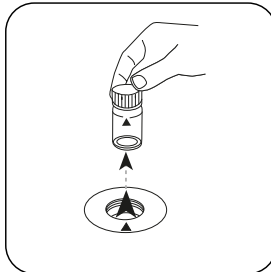
密封比色杯。



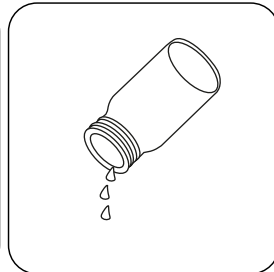
将样本比色杯放入测量轴中。注意定位。



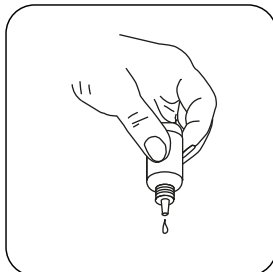
按下 ZERO 按钮。



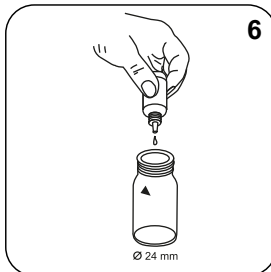
从测量轴上取下比色杯。



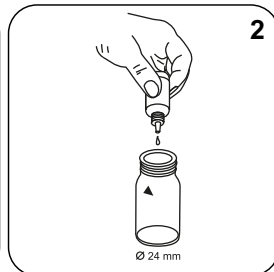
倒空比色杯。



垂直握住滴瓶，慢慢加入相同大小的滴剂。



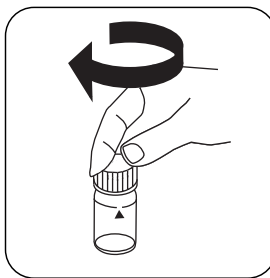
加入 6 滴 DPD 1 Buffer Solution。



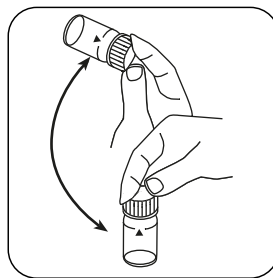
加入 2 滴 DPD 1 Reagent Solution。



用样本将比色杯填充至  
10 ml 刻度处。

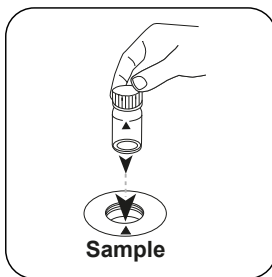


密封比色杯。

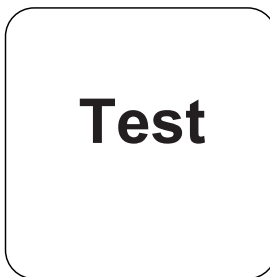


通过旋转混合内容物。

ZH



将样本比色杯放入测量轴  
中。注意定位。  
结果在显示屏上显示为 mg / l 余氯。



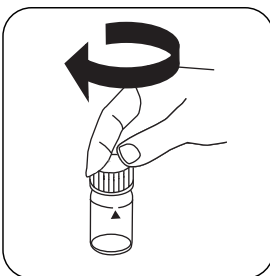
按下 **TEST (XD: START)** 按  
钮。

### 进行测定 总氯 水剂法

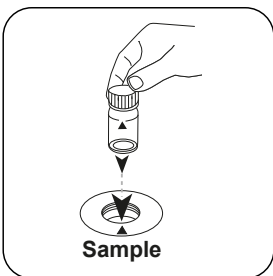
选择设备中的方法。  
另外选择测定：总氯



用 10 ml 样本填充 24 mm  
比色杯。



密封比色杯。

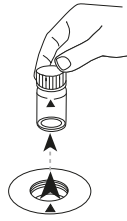


将样本比色杯放入测量轴  
中。注意定位。



# Zero

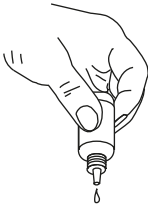
按下 **ZERO** 按钮。



从测量轴上取下比色杯。



倒空比色杯。



垂直握住滴瓶，慢慢加入相同大小的滴剂。



加入 **6 滴 DPD 1 Buffer Solution**。



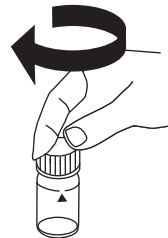
加入 **2 滴 DPD 1 Reagent Solution**。



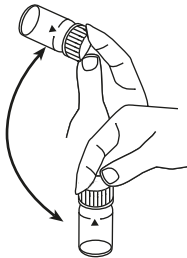
加入 **3 滴 DPD 3 Solution**。



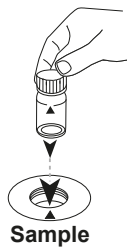
用样本将比色杯填充至 **10 ml 刻度处**。



密封比色杯。



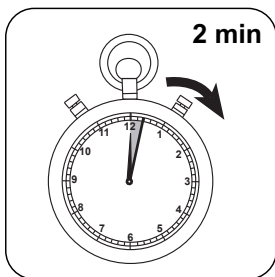
通过旋转混合内容物。



将样本比色杯放入测量轴中。注意定位。

# Test

按下 **TEST (XD: START)** 按钮。



等待 2 分钟反应时间。  
反应时间结束后，自动进行测量。  
结果在显示屏上显示为 mg / l 总氯。





## 化学方法

DPD

## 附录

ZH

### 干扰说明

#### 持续干扰

- 存在于样本中的所有氧化剂都像氯一样反应，导致多重结果。

#### 可消除干扰

- 铜和铁 ( III ) 的干扰必须通过 EDTA 消除。
- 在使用液剂时，高于 4 mg/L 氯的浓度可导致测量范围内的结果高达 0 mg/L。在这种情况下应用无氯水稀释样本。将 10 ml 稀释的样本与试剂混合并重复测量 ( 可信度测试 )。

1. Interferences	1. Interferes from
CrO <sub>4</sub> <sup>2-</sup>	0,01
MnO <sub>2</sub>	0,01

#### 一致性

EN ISO 7393-2

<sup>a)</sup> 测定余氯，总氯和结合氯





T pH 值

M330

6.5 - 8.4 pH

PH

苯酚红

ZH

## 材料

所需材料 ( 部分可选 ) :

标题	Verpackungseinheit 货号	
酚红光度计	片剂 / 100	511770BT
酚红光度计	片剂 / 250	511771BT
酚红光度计	片剂 / 500	511772BT

## 备注

1. 对于光度 pH 值测定，只应使用标有 PHOTOMETER 的带有黑色烫印的 PHENOL RED 片剂。

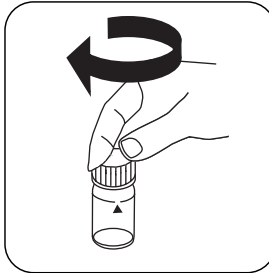


## 进行测定 pH 值片剂

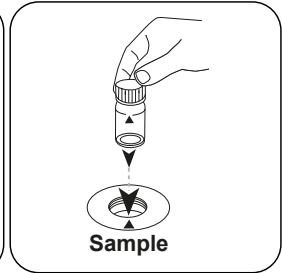
选择设备中的方法。



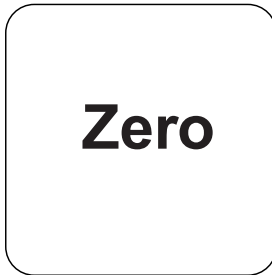
用 10 ml 样本填充 24 mm 比色杯。



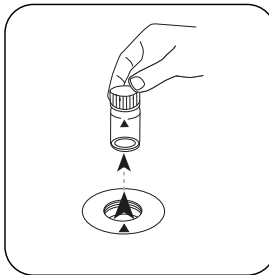
密封比色杯。



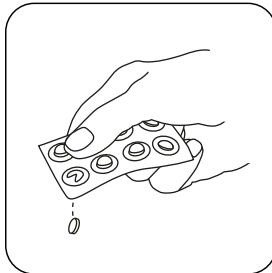
将样本比色杯放入测量轴中。注意定位。



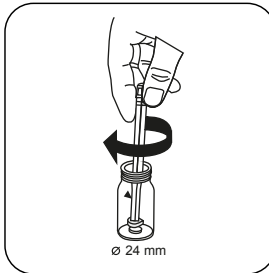
按下 ZERO 按钮。



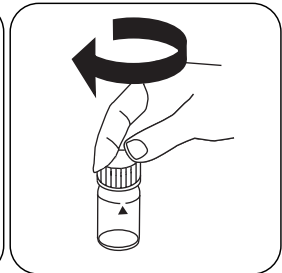
从测量轴上取下比色杯。



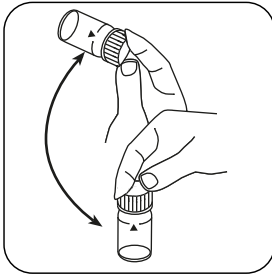
加入 PHENOL RED PHOTOMETER 片剂。



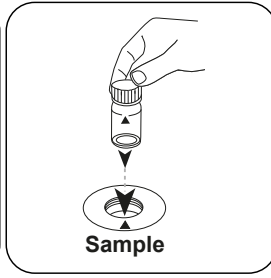
用轻微的扭转压碎片剂。



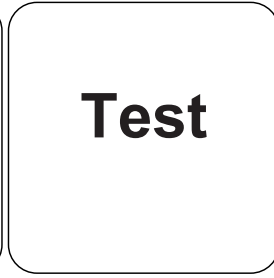
密封比色杯。



通过旋转溶解试剂。



将样本比色杯放入测量轴中。注意定位。



按下 **TEST (XD: START)** 按钮。

结果在显示屏上显示为 pH 值。

ZH

## 化学方法

苯酚红

## 附录

### 干扰说明

#### 持续干扰

1. 碳酸盐硬度\*低的水样可能会得出错误的 pH 值。

\* $K_{S_{4,3}} < 0,7 \text{ mmol/l} \triangleq \text{总碱度} < 35 \text{ mg/L CaCO}_3$ .

#### 可消除干扰

1. pH 值低于 6.5 和高于 8.4 可导致测量范围内的结果。建议使用可信度测试 (pH 计)。

2. 盐误差：

对于盐含量高达 2 g/L，试剂片的盐含量不会引起明显的盐误差。对于较高的盐含量，测量值应进行如下校正：

样本的盐含量以 g/L 为单位	30 (海水)	60	120	180
校正	-0,15 <sup>1)</sup>	-0,21 <sup>2)</sup>	-0,26 <sup>2)</sup>	-0,29 <sup>2)</sup>

<sup>1)</sup> 根据 Koltthoff (1922)

<sup>2)</sup> 根据 Parson 和 Douglas (1926)

#### 参考文献

Colorimetric Chemical Analytical Methods, 9th Edition, London



L pH 值

M331

6.5 - 8.4 pH

PH

苯酚红

ZH

## 材料

所需材料 ( 部分可選 ) :

标题	Verpackungseinheit 货号	
酚红溶液	15 mL	471040
酚红溶液	100 mL	471041
酚红溶液 6 件装	1 片	471046

## 准备

1. 由于液滴大小不同，测量结果可能会比使用片剂时有更大的偏差。  
使用移液管 ( 0.18 ml 相当于 6 滴 ) 时这种偏差可以最小化。

## 备注

1. 使用后滴瓶必须立即用相同颜色的瓶盖重新密封。
2. 将试剂冷藏 in +6 °C 至 + 10 °C。

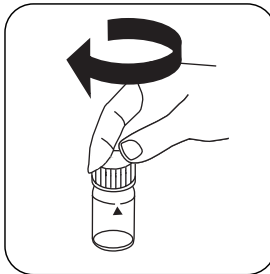


## 进行测定 pH 值液剂

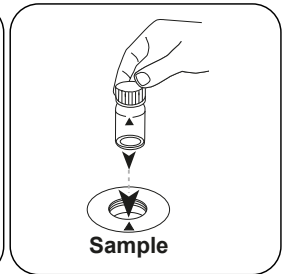
选择设备中的方法。



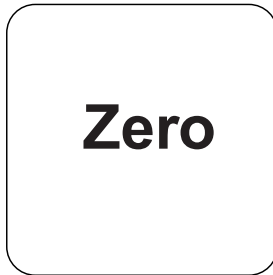
用 **10 ml** 样本填充 24 mm 比色杯。



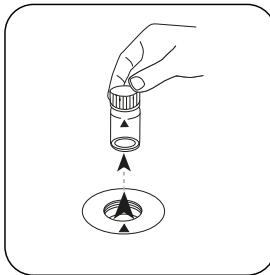
密封比色杯。



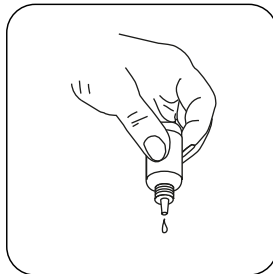
将样本比色杯放入测量轴中。注意定位。



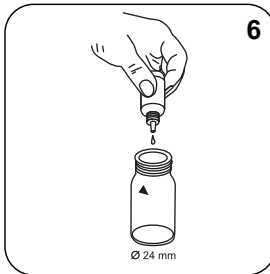
按下 **ZERO** 按钮。



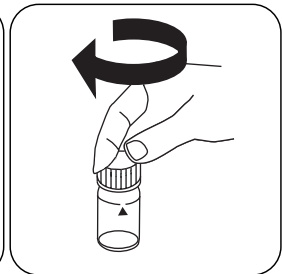
从测量轴上取下比色杯。



垂直握住滴瓶，慢慢加入相同大小的滴剂。

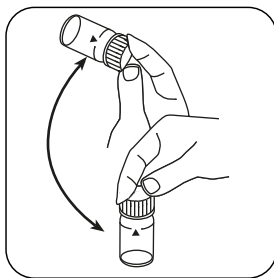


加入 **6 滴 PHENOL Red-Lösung**。

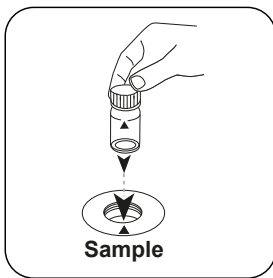


密封比色杯。

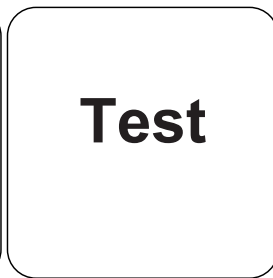




通过旋转混合内容物。



将样本比色杯放入测量轴中。注意定位。



按下 **TEST (XD: START)** 按钮。

结果在显示屏上显示为 pH 值。

ZH

## 化学方法

苯酚红

## 附录

### 干扰说明

#### 可消除干扰

1. 盐误差：通过盐含量校正样本的测量值（平均值）：

2. 样本盐含量	校正
30 g/L ( 海水 )	-0,15 <sup>1)</sup>
60 g/L	-0,21 <sup>2)</sup>
120 g/L	-0,26 <sup>2)</sup>
180 g/L	-0,29 <sup>2)</sup>

<sup>1)</sup> 根据 Kolthoff (1922)

<sup>2)</sup> 根据 Parson 和 Douglas (1926)

3. 分析氯化水时存在的残余氯含量会影响液体试剂的显色反应。在添加 PHENOL RED 溶液之前，向样本溶液中加入一小块硫代硫酸钠晶体 ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$ ) 来防止这种情况。

#### 参考文献

Colorimetric Chemical Analytical Methods, 9th Edition, London









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