Lovibond® Water Testing

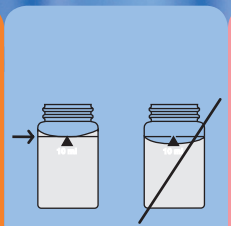
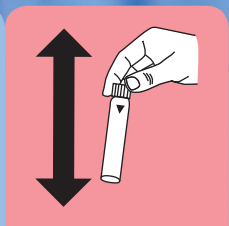
Tintometer® Group

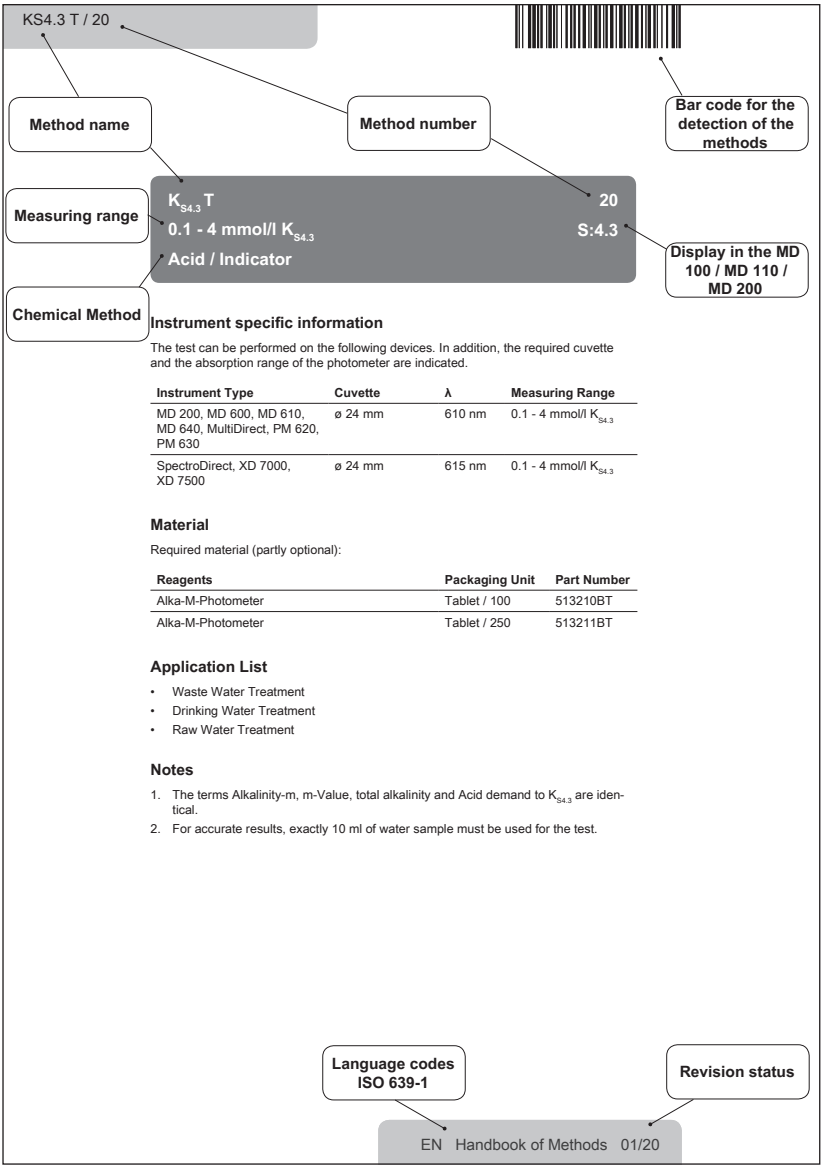
Manual of Methods

MD 100 • MD 110 • MD 200

Chlorine | Chlorine Dioxide





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	λ	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.

Performing test procedure

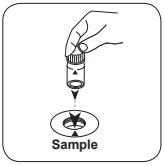
Implementation of the provision Acid capacity $K_{S4.3}$ with Tablet

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**.

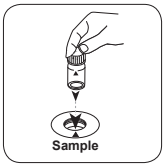
Close vial(s).



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_2 [a] CL6

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	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 [e]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e]	Tablet / 500	515742BT
DPD No. 3 High Calcium [e]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e]	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

Available Standards

Title	Packaging Unit	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

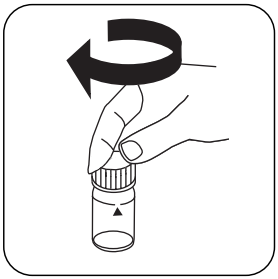
1. Evo tablets can be used as an alternative to the corresponding standard tablet (e.g. DPD No.3 Evo instead of DPD No.3).

EN

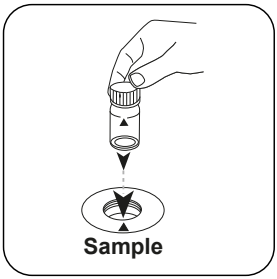
Determination of free chlorine with tablet

Select the method on the device.

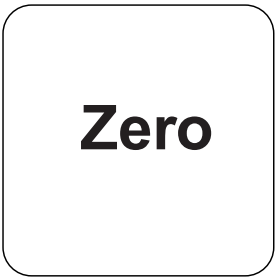
Fill 24 mm vial with **10 mL sample**.



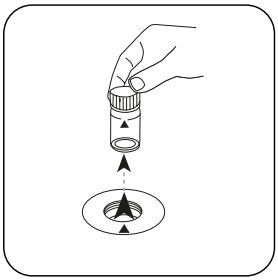
Close vial(s).



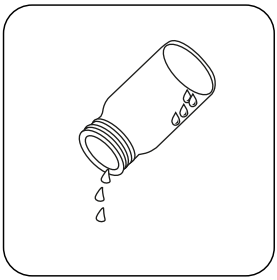
Place **sample vial** in the sample chamber. Pay attention to the positioning.



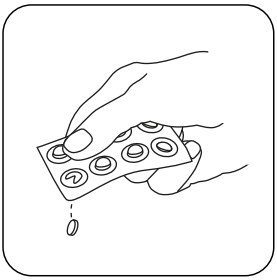
Press the **ZERO** button.



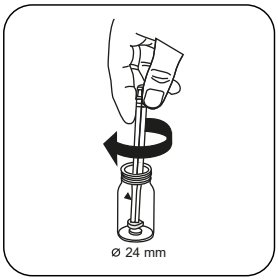
Remove the vial from the sample chamber.



Empty vial except for a few drops.

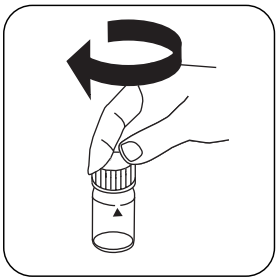


Add **DPD No. 1 tablet** .

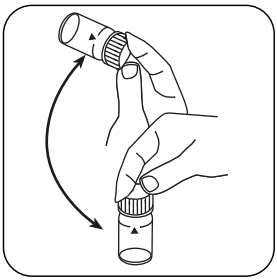


Crush tablet(s) by rotating slightly.

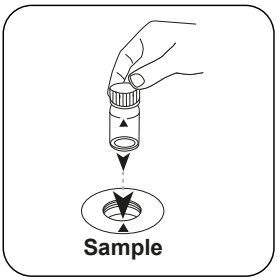
Fill up vial with **sample** to the **10 mL mark**.



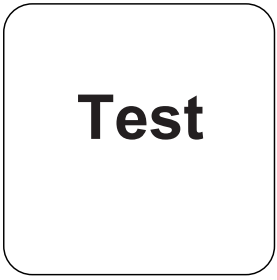
Close vial(s).



Dissolve tablet(s) by inverting.



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



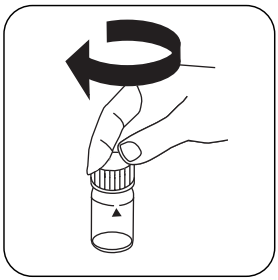
Press the **TEST** (XD: **START**)button.

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

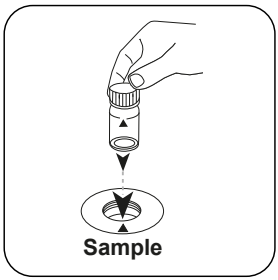
Determination of total Chlorine with tablet

Select the method on the device.

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

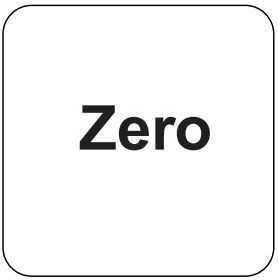


Close vial(s).

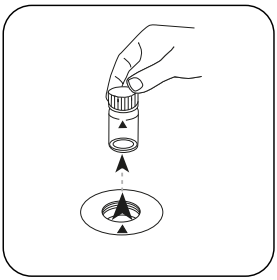


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN

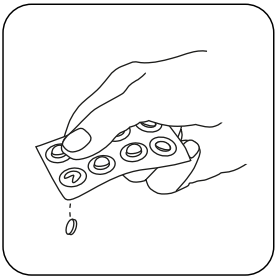


Press the **ZERO** button.

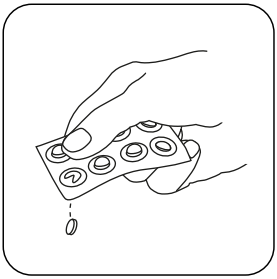


Remove the vial from the sample chamber.

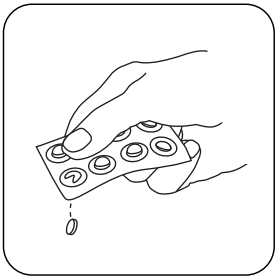
Empty vial except for a few drops.



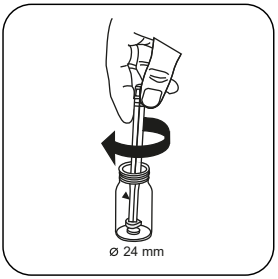
Add **DPD No. 1 tablet** .



Add **DPD No. 3 tablet** .

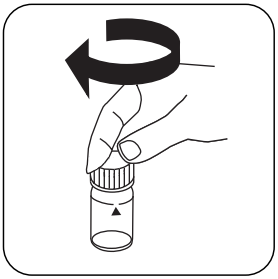


As an alternative to DPD No. 1 and No. 3 tablets, a DPD No. 4 tablet can be added.

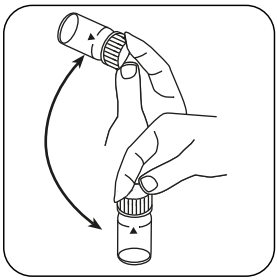


Crush tablet(s) by rotating slightly.

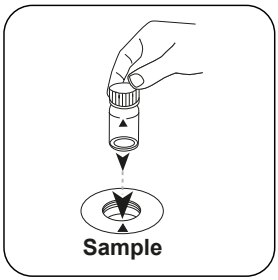
Fill up vial with **sample** to the **10 mL mark**.



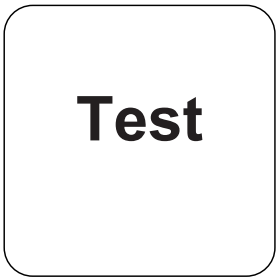
Close vial(s).



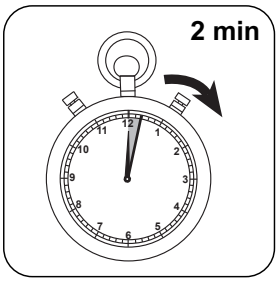
Dissolve tablet(s) by inverting.



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

Persistant 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).

Interference	from / [mg/L]
CrO_4^{2-}	0.01
MnO_2	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

[a] determination of free, combined and total | [e] 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_2 [a] CL6

DPD

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
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

Title	Packaging Unit	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

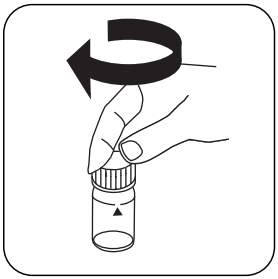
1. After use, ensure the cuvettes are once again closed with the respective same-coloured screw caps.
2. Reagent sets are to be stored in the cool at +6 °C to +10 °C.

Determination of free chlorine with liquid reagent

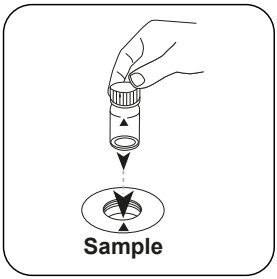
Select the method on the device.

EN

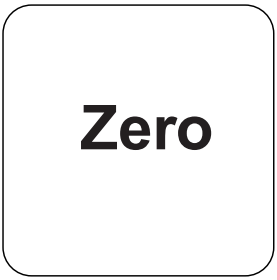
Fill 24 mm vial with **10 mL sample**.



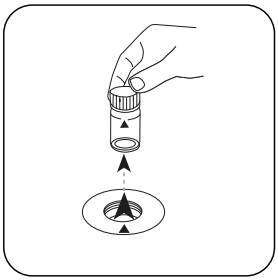
Close vial(s).



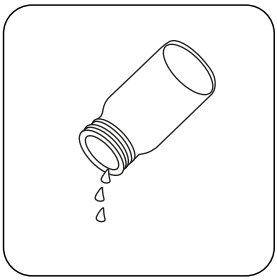
Place **sample vial** in the sample chamber. Pay attention to the positioning.



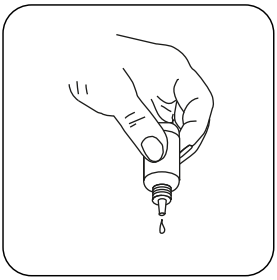
Press the **ZERO** button.



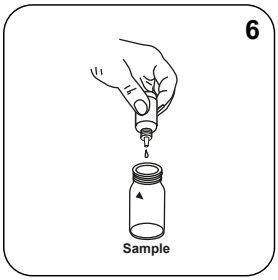
Remove the vial from the sample chamber.



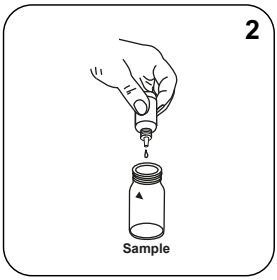
Empty vial.



Hold cuvettes vertically and add equal drops by pressing slowly.

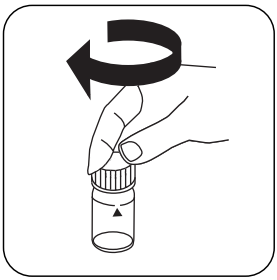


Add **6 drops DPD 1 Buffer Solution** to the **sample vial**.

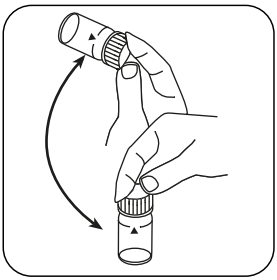


Add **2 drops DPD 1 Reagent Solution** to the **sample vial**.

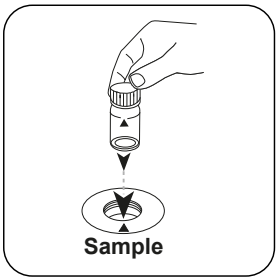
Fill up vial with **sample** to the **10 mL mark**.



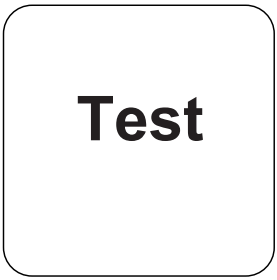
Close vial(s).



Invert several times to mix the contents.



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



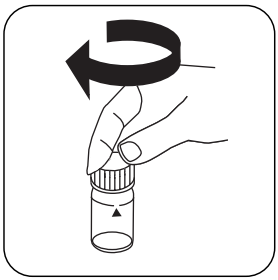
Press the **TEST** (XD: **START**)button.

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

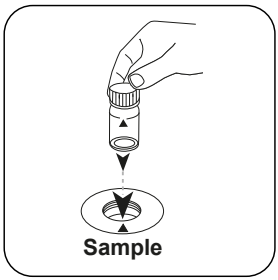
Determination of totale Chlorine with liquid reagent

Select the method on the device.

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

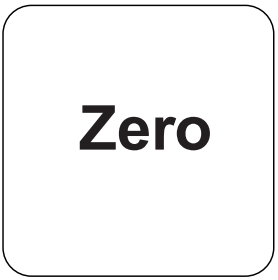


Close vial(s).

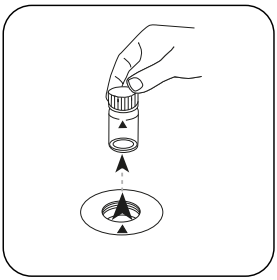


Place **sample vial** in the sample chamber. Pay attention to the positioning.

EN

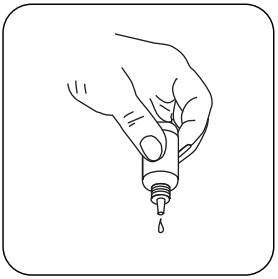


Press the **ZERO** button.

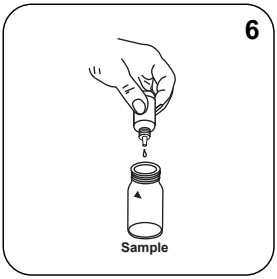


Remove the vial from the sample chamber.

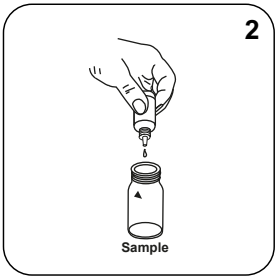
Empty vial.



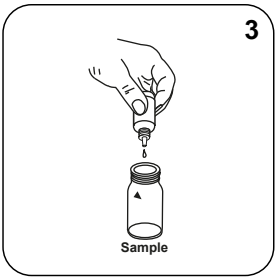
Hold cuvettes vertically and add equal drops by pressing slowly.



Add **6 drops DPD 1 Buffer Solution** to the **sample vial**.

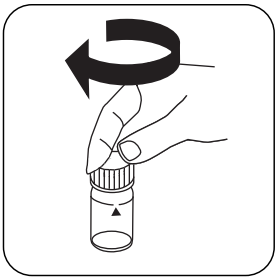


Add **2 drops DPD 1 Reagent Solution** to the **sample vial**.

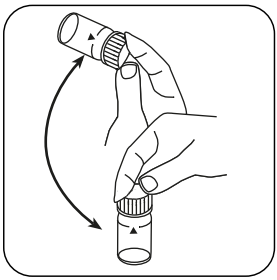


Add **3 drops DPD 3 Solution** to the **sample vial**.

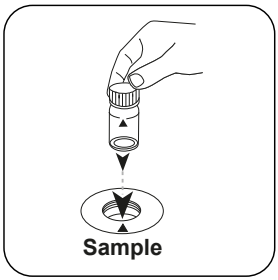
Fill up vial with **sample** to the **10 mL mark**.



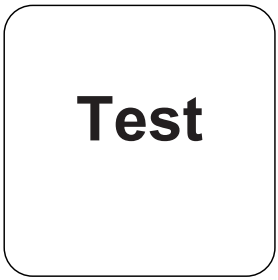
Close vial(s).



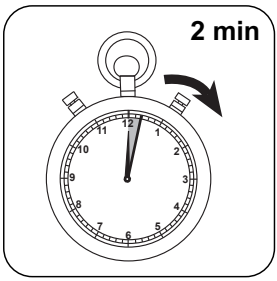
Invert several times to mix the contents.



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



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

Persistant 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).

Interference	from / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conformity

EN ISO 7393-2

[a] determination of free, combined and total

Chlorine HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI / Acid

EN

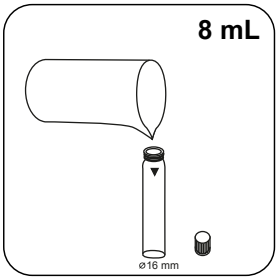
Material

Required material (partly optional):

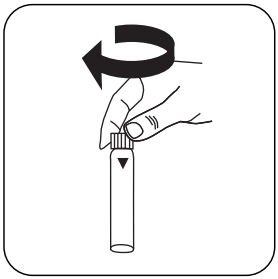
Reagents	Packaging Unit	Part Number
Chlorine HR (KI)	Tablet / 100	513000BT
Chlorine HR (KI)	Tablet / 250	513001BT
Acidifying GP	Tablet / 100	515480BT
Acidifying GP	Tablet / 250	515481BT
Set Chlorine HR (KI)/Acidifying GP 100 Pc. #	100 each	517721BT
Set Chlorine HR (KI)/Acidifying GP 250 Pc. #	250 each	517722BT
Chlorine HR (KI)	Tablet / 100	501210
Chlorine HR (KI)	Tablet / 250	501211

Determination of Chlorine HR (KI) with Tablet

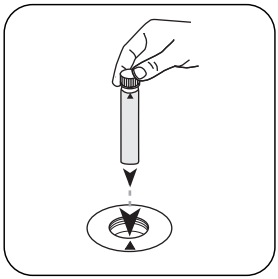
Select the method on the device.



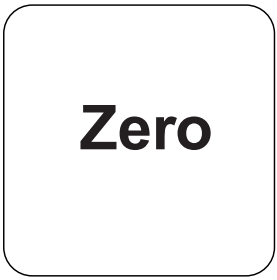
Fill 16 mm vial with **8 mL sample**.



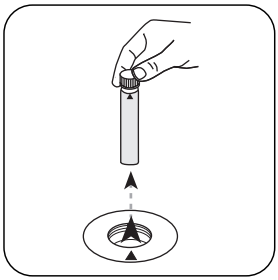
Close vial(s).



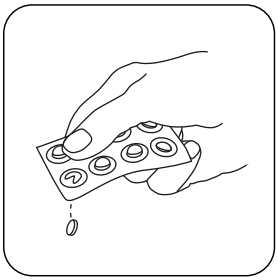
Place **sample vial** in the sample chamber. • Pay attention to the positioning.



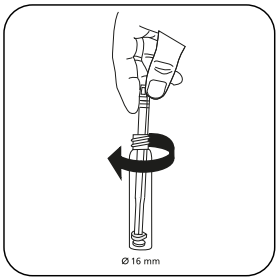
Press the **ZERO** button.



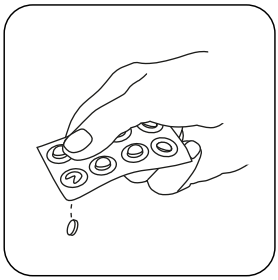
Remove **vial** from the sample chamber.



Add **Chlorine HR (KI) tablet**.



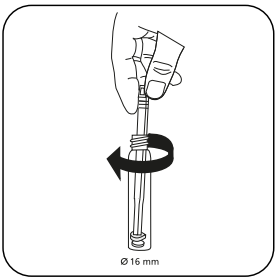
Crush tablet(s) by rotating slightly.



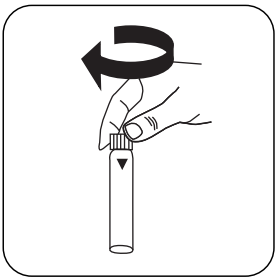
Add **ACIDIFYING GP tablet**.

EN

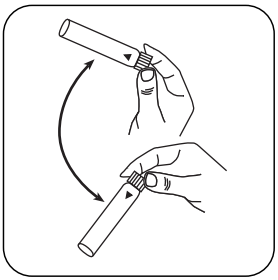
EN



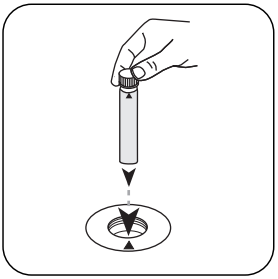
Crush tablet(s) by rotating slightly.



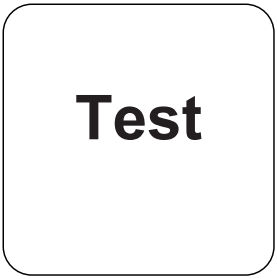
Close vial(s).



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 mg/L Chlorine appears on the display.

Chemical Method

KI / Acid

Appendix

Interferences

Persistant Interferences

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

Method Validation

Limit of Detection	1.29 mg/L
Limit of Quantification	3.86 mg/L
End of Measuring Range	200 mg/L
Sensitivity	83.96 mg/L / Abs
Confidence Intervall	1.14 mg/L
Standard Deviation	0.45 mg/L
Variation Coefficient	0.45 %

Derived from

EN ISO 7393-3

including stirring rod, 10 cm

Chlorine dioxide T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / Glycine

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	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
Glycine [f)]	Tablet / 100	512170BT
Glycine [f)]	Tablet / 250	512171BT
DPD No. 3 High Calcium [e)]	Tablet / 100	515730BT
DPD No. 3 High Calcium [e)]	Tablet / 250	515731BT
DPD No. 3 High Calcium [e)]	Tablet / 500	515732BT
DPD No. 1 High Calcium [e)]	Tablet / 100	515740BT
DPD No. 1 High Calcium [e)]	Tablet / 250	515741BT
DPD No. 1 High Calcium [e)]	Tablet / 500	515742BT
Set DPD No. 1/No. 3 100 Pc.[#]	100 each	517711BT
Set DPD No. 1/No. 3 250 Pc.[#]	250 each	517712BT
Set DPD No. 1/Glycine 100 Stck. [#]	100 each	517731BT
Set DPD No. 1/Glycine 250 Stck. [#]	250 each	517732BT
Set DPD No. 1/No. 3 High Calcium 100 Pc. [#]	100 each	517781BT
Set DPD No. 1/No. 3 High Calcium 250 Pc. [#]	250 each	517782BT
DPD No. 3 Evo	Tablet / 100	511420BT
DPD No. 3 Evo	Tablet / 250	511421BT
DPD No. 3 Evo	Tablet / 500	511422BT

Sampling

1. When preparing the sample, 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 dioxide. 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. Strong alkaline or acidic water samples must 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).

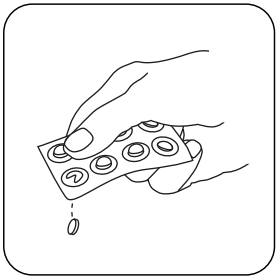
EN

Determination of Chlorine Dioxide, in presence of chlorine with tablet

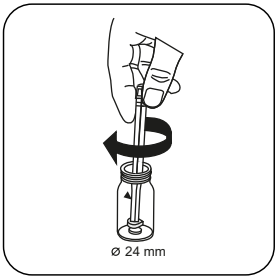
Select the method on the device.

In addition, choose the test: in presence of Chlorine

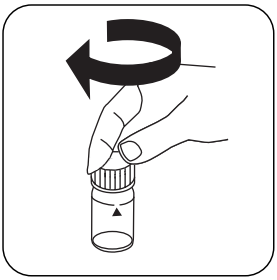
Fill 24 mm vial with **10 mL sample**.



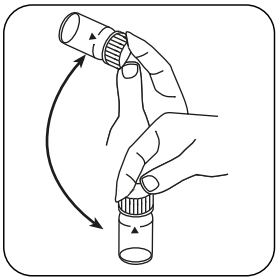
Add **GLYCINE tablet**.



Crush tablet(s) by rotating slightly.

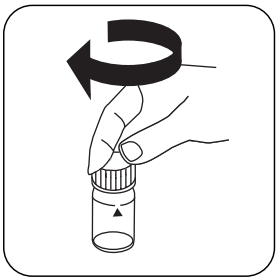


Close vial(s).

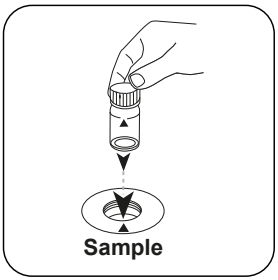


Dissolve tablet(s) by inverting.

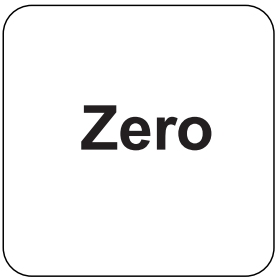
Fill a **second vial** with **10 mL sample** .



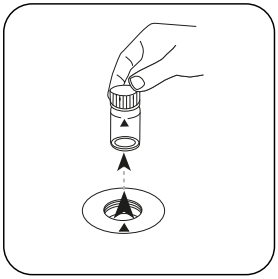
Close vial(s).



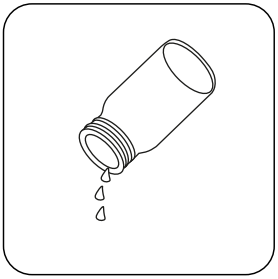
Place **sample vial** in the sample chamber. Pay attention to the positioning.



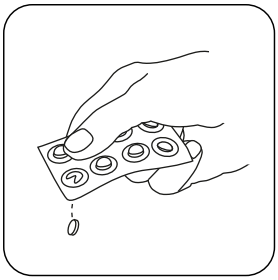
Press the **ZERO** button.



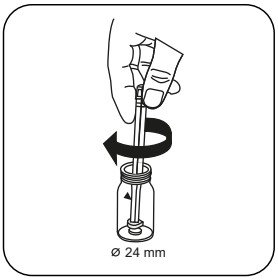
Remove the vial from the sample chamber.



Empty vial.



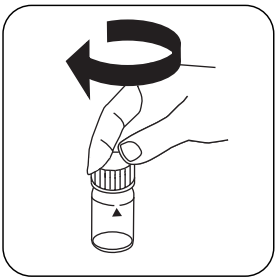
Add **DPD No. 1 tablet** .



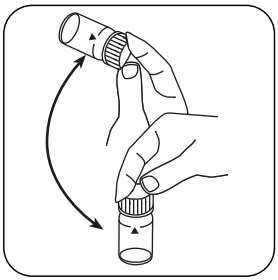
Crush tablet(s) by rotating slightly.

Fill prepared vial with prepared **glycine solution**.

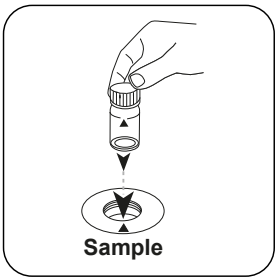
EN



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 mg/L Chlorine Dioxide appears on the display.

Analyses

The following table identifies the output values can be converted into other citation forms.

Unit	Cite form	Scale Factor
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Chemical Method

DPD / Glycine

Appendix

Interferences

Persistant Interferences

1. All oxidising agents in the samples lead to higher results.

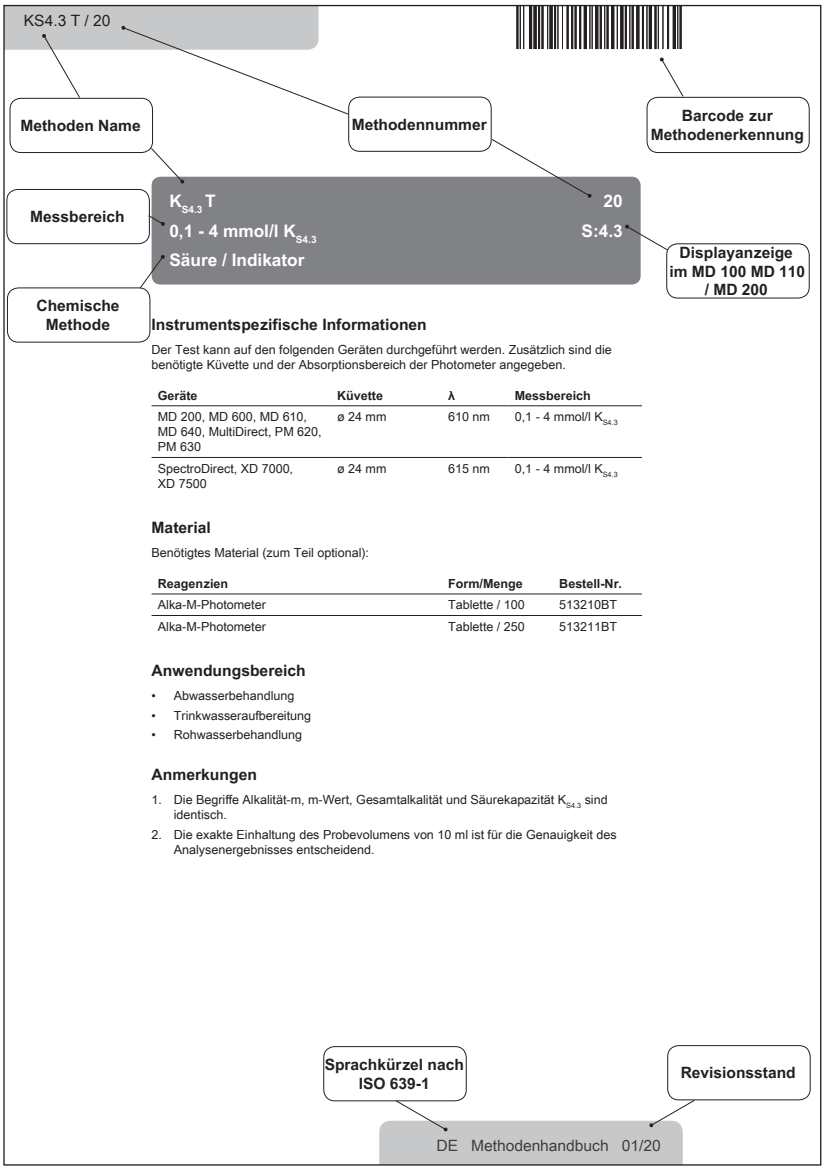
Removeable Interferences

1. Concentrations above 19 mg/L chlorine dioxide can lead to results within the measuring range of up to 0 mg/L. In this case, the water sample must be diluted with water that is free from chlorine dioxide. 10 ml of the diluted sample should be mixed with the reagent and the measurement taken again.

Derived from

DIN 38408, Section 5

[e)] 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 | [f)] additionally required for determination of bromine, chlorine dioxide and ozone in the presence of chlorine | [#] including stirring rod, 10 cm



Instrumentspezifische Informationen

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

Geräte	Küvette	λ	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 Analysenergebnisses entscheidend.

Durchführung der Messung

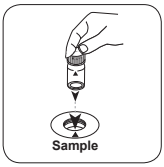
Durchführung der Bestimmung Säurekapazität $K_{S4.3}$ mit Tablette

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.

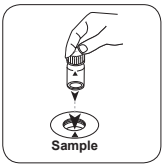
Küvette(n) verschließen.



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_2 [a] CL6

DPD

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
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 [e]	Tablette / 100	515740BT
DPD No. 1 High Calcium [e]	Tablette / 250	515741BT
DPD No. 1 High Calcium [e]	Tablette / 500	515742BT
DPD No. 3 High Calcium [e]	Tablette / 100	515730BT
DPD No. 3 High Calcium [e]	Tablette / 250	515731BT
DPD No. 3 High Calcium [e]	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

Verfügbare Standards

Titel	Verpackungseinheit	Bestell-Nr.
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-Farbentwicklung 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).

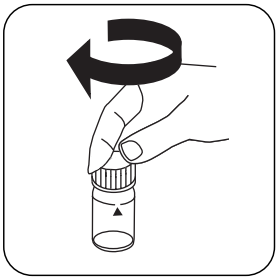
Anmerkungen

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

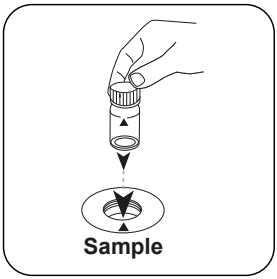
Durchführung der Bestimmung freies Chlor mit Tablette

Die Methode im Gerät auswählen.

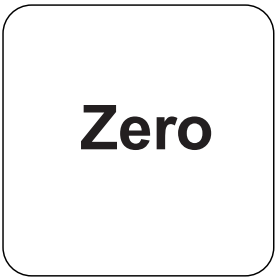
24-mm-Küvette mit **10 mL Probe** füllen.



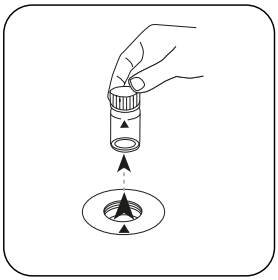
Küvette(n) verschließen.



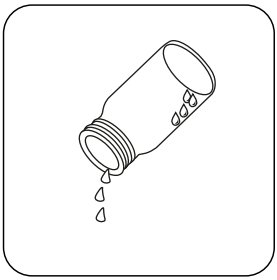
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



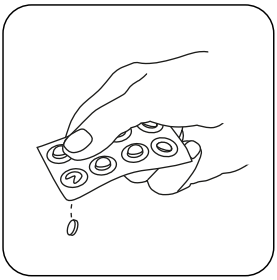
Taste **ZERO** drücken.



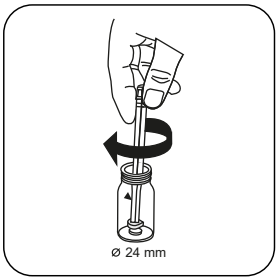
Küvette aus dem Messschacht nehmen.



Die Küvette bis auf einige Tropfen entleeren.

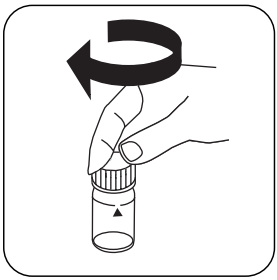


Eine **DPD No. 1 Tablette** zugeben.

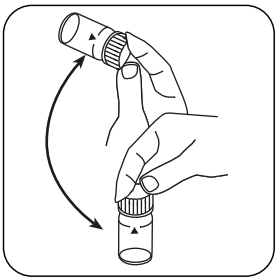


Tablette(n) unter leichter Drehung zerdrücken.

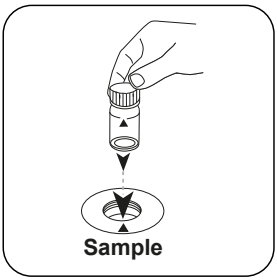
Küvette bis zur **10-mL-Marke** mit der **Probe** auffüllen.



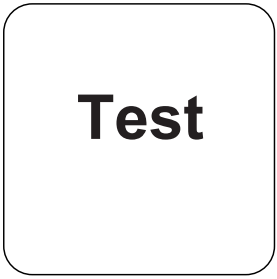
Küvette(n) verschließen.



Tablette(n) durch Umschwenken lösen.



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



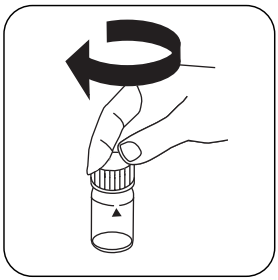
Taste **TEST** (XD: **START**) drücken.

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

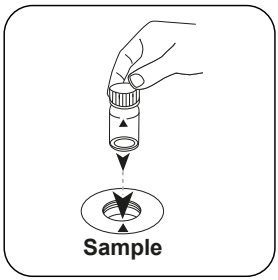
Durchführung der Bestimmung gesamt Chlor mit Tablette

Die Methode im Gerät auswählen.

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

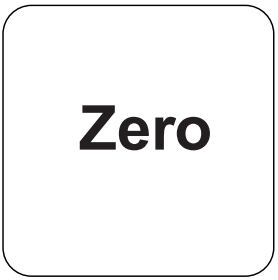


Küvette(n) verschließen.

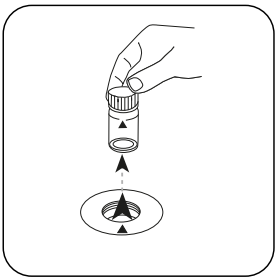


Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

DE

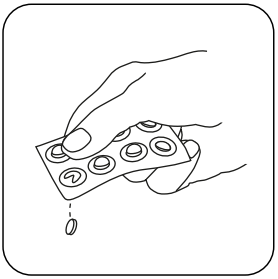


Taste **ZERO** drücken.

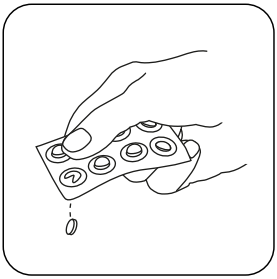


Küvette aus dem Messschacht nehmen.

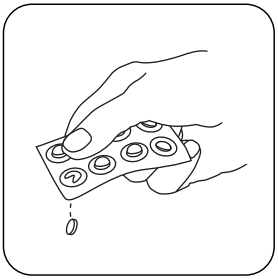
Die Küvette bis auf einige Tropfen entleeren.



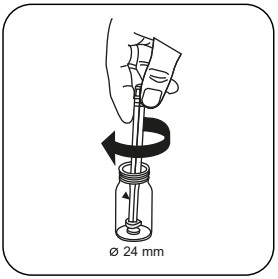
Eine **DPD No. 1 Tablette** zugeben.



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

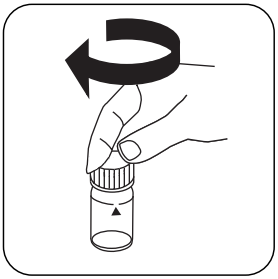


Alternativ zur DPD Nr. 1 und Nr. 3 Tablette kann eine DPD Nr. 4 Tablette zugegeben werden.

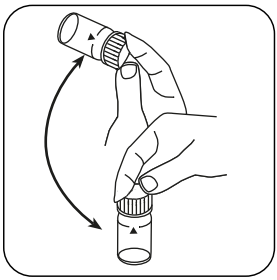


Tablette(n) unter leichter Drehung zerdrücken.

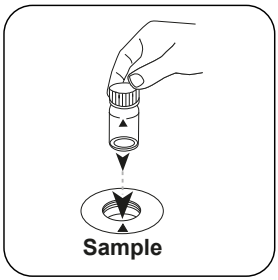
Küvette bis zur **10-mL-Marke** mit der **Probe** auffüllen.



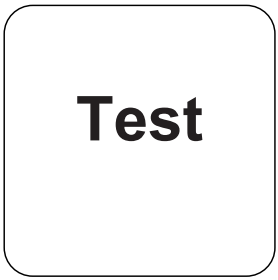
Küvette(n) verschließen.



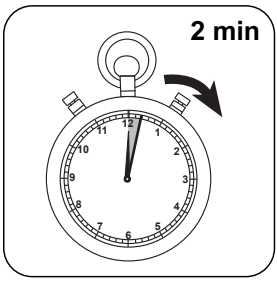
Tablette(n) durch Umschwenken lösen.



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



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



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 chlorfreiem Wasser verdünnt werden. 10 mL der verdünnten Probe werden mit Reagenz versetzt und die Messung wiederholt (Plausibilitätstest).

Störung	Stört ab / [mg/L]
CrO_4^{2-}	0.01
MnO_2	0.01

Methodenvalidierung

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

Konform

EN ISO 7393-2

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

Chlor L M101

0,02 - 4,0 mg/L Cl_2 [a)] CL6

DPD

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
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

Titel	Verpackungseinheit	Bestell-Nr.
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-Farbentwicklung 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).

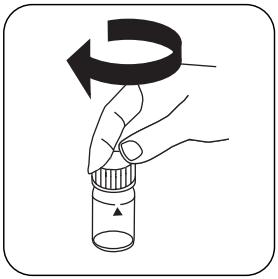
Anmerkungen

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.

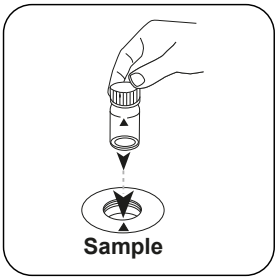
Durchführung der Bestimmung freies Chlor mit Flüssigreagenz

Die Methode im Gerät auswählen.

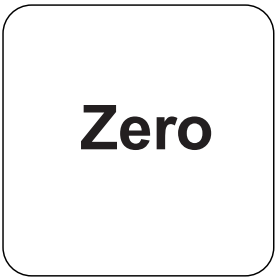
24-mm-Küvette mit **10 mL Probe** füllen.



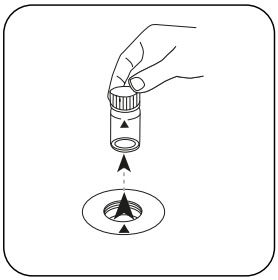
Küvette(n) verschließen.



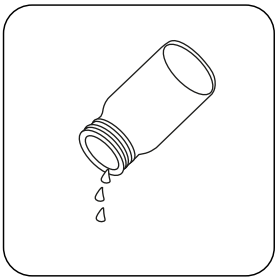
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



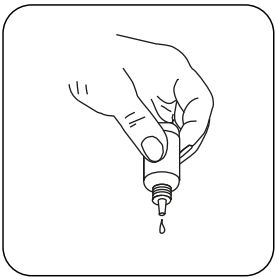
Taste **ZERO** drücken.



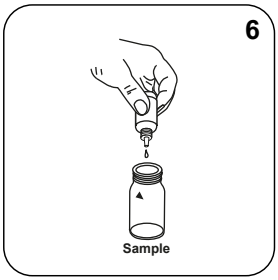
Küvette aus dem Messschacht nehmen.



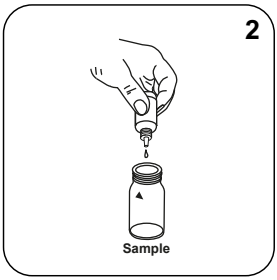
Küvette entleeren.



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

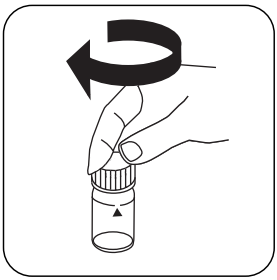


6 Tropfen DPD 1 Puffer-Lösung in die **Probenküvette** geben.

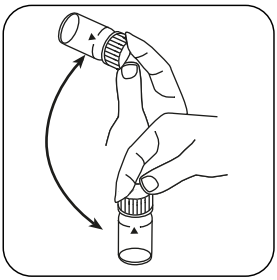


2 Tropfen DPD 1 Reagenz-Lösung in die **Probenküvette** geben.

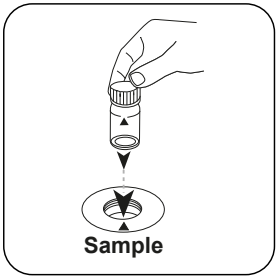
Küvette bis zur **10-mL-Marke** mit der **Probe** auffüllen.



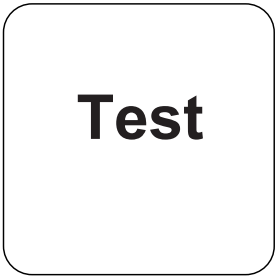
Küvette(n) verschließen.



Inhalt durch Umschwenken mischen.



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



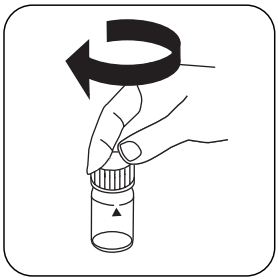
Taste **TEST** (XD: **START**) drücken.

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

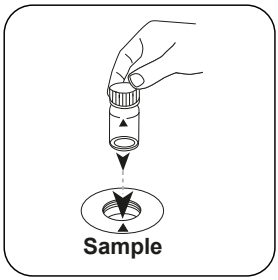
Durchführung der Bestimmung gesamtes Chlor mit Flüssigreagenz

Die Methode im Gerät auswählen.

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

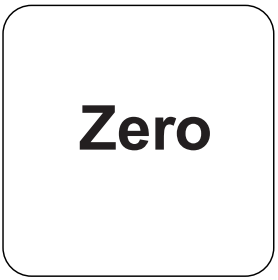


Küvette(n) verschließen.

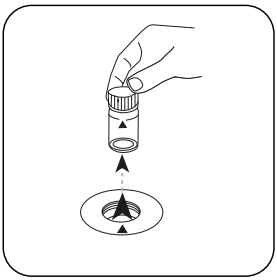


Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

DE

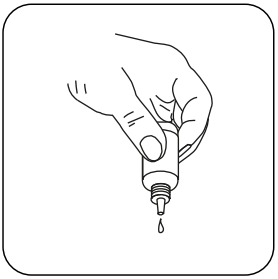


Taste **ZERO** drücken.

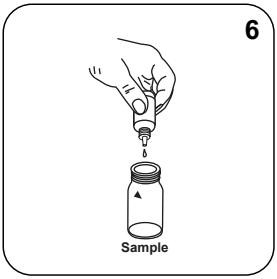


Küvette aus dem Messschacht nehmen.

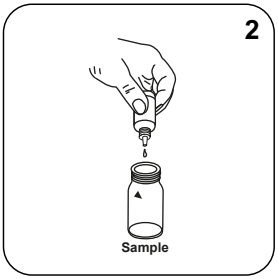
Küvette entleeren.



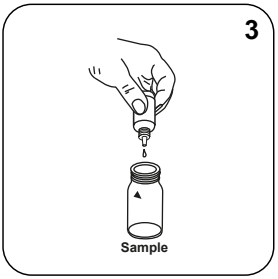
Die Tropfflaschen senkrecht halten und durch langsames Drücken gleich große Tropfen zugeben.



6 Tropfen DPD 1 Puffer-Lösung in die **Probenküvette** geben.

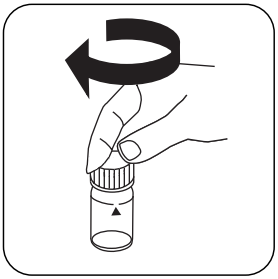


2 Tropfen DPD 1 Reagenz-Lösung in die **Probenküvette** geben.

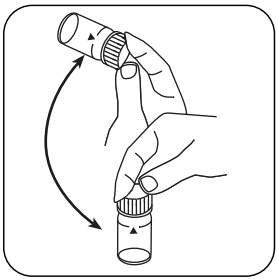


3 Tropfen DPD 3 Lösung in die **Probenküvette** geben.

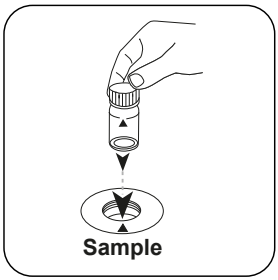
Küvette bis zur **10-mL-Marke** mit der **Probe** auffüllen.



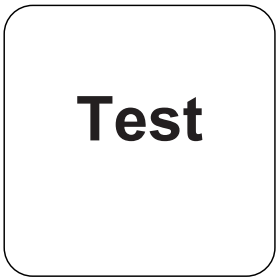
Küvette(n) verschließen.



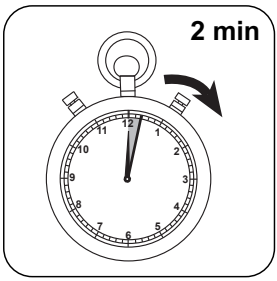
Inhalt durch Umschwenken mischen.



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



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



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).

Störung	Stört ab / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Konform

EN ISO 7393-2

[a)] Bestimmung von frei, gebunden, gesamt möglich

Chlor HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI / Säure

DE

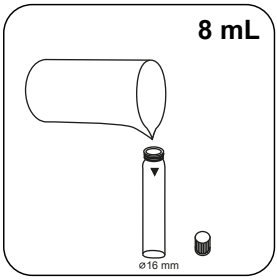
Material

Benötigtes Material (zum Teil optional):

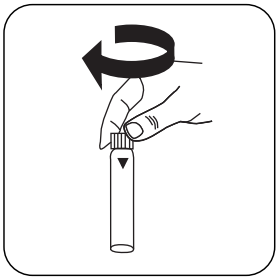
Reagenzien	Form/Menge	Bestell-Nr.
Chlorine HR (KI)	Tablette / 100	513000BT
Chlorine HR (KI)	Tablette / 250	513001BT
Acidifying GP	Tablette / 100	515480BT
Acidifying GP	Tablette / 250	515481BT
Set Chlorine HR (KI)/Acidifying GP#	je 100	517721BT
Set Chlorine HR (KI)/Acidifying GP#	je 250	517722BT
Chlorine HR (KI)	Tablette / 100	501210
Chlorine HR (KI)	Tablette / 250	501211

Durchführung der Bestimmung Chlor HR (KI) mit Tablette

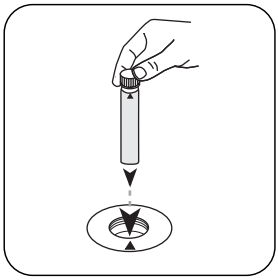
Die Methode im Gerät auswählen.



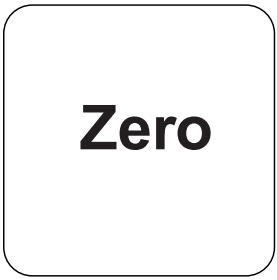
16-mm-Küvette mit **8 mL Probe** füllen.



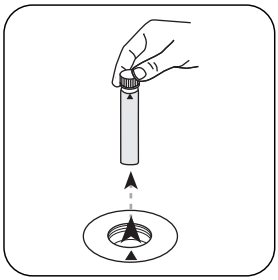
Küvette(n) verschließen.



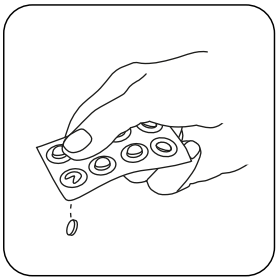
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



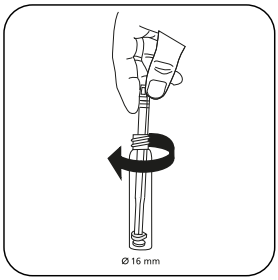
Taste **ZERO** drücken.



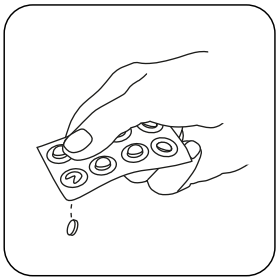
Die **Küvette** aus dem Messschacht nehmen.



Eine **Chlorine HR (KI) Tablette** zugeben.

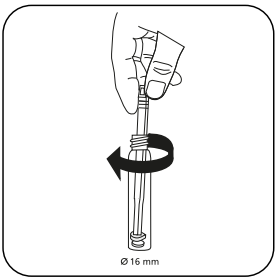


Tablette(n) unter leichter Drehung zerdrücken.

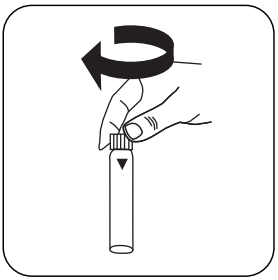


Eine **ACIDIFYING GP Tablette** zugeben.

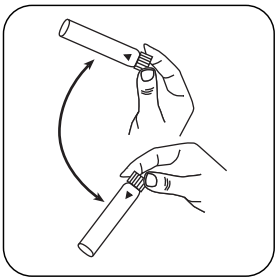
DE



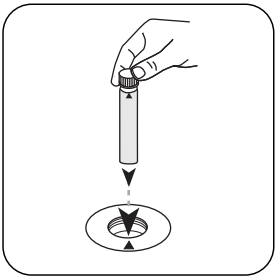
Tablette(n) unter leichter Drehung zerdrücken.



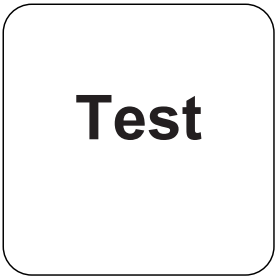
Küvette(n) verschließen.



Tablette(n) durch Umschwenken lösen.



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



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

In der Anzeige erscheint das Ergebnis in mg/L Chlor.

Chemische Methode

KI / Säure

Appendix

Störungen

Permanente Störungen

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

Methodenvalidierung

Nachweisgrenze	1.29 mg/L
Bestimmungsgrenze	3.86 mg/L
Messbereichsende	200 mg/L
Empfindlichkeit	83.96 mg/L / Abs
Vertrauensbereich	1.14 mg/L
Verfahrensstandardabweichung	0.45 mg/L
Verfahrensvariationskoeffizient	0.45 %

Abgeleitet von

EN ISO 7393-3

[#] inklusive Rührstab

Chlordioxid T M120

0,02 - 11 mg/L ClO_2 CLO2

DPD / Glycin

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
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
Glycine [f)]	Tablette / 100	512170BT
Glycine [f)]	Tablette / 250	512171BT
DPD No. 3 High Calcium [e)]	Tablette / 100	515730BT
DPD No. 3 High Calcium [e)]	Tablette / 250	515731BT
DPD No. 3 High Calcium [e)]	Tablette / 500	515732BT
DPD No. 1 High Calcium [e)]	Tablette / 100	515740BT
DPD No. 1 High Calcium [e)]	Tablette / 250	515741BT
DPD No. 1 High Calcium [e)]	Tablette / 500	515742BT
Set DPD No. 1/No. 3#	je 100	517711BT
Set DPD No. 1/No. 3#	je 250	517712BT
Set DPD No. 1/Glycine #	je 100	517731BT
Set DPD No. 1/Glycine #	je 250	517732BT
Set DPD No. 1/No. 3 High Calcium#	je 100	517781BT
Set DPD No. 1/No. 3 High Calcium#	je 250	517782BT
DPD No. 3 Evo	Tablette / 100	511420BT
DPD No. 3 Evo	Tablette / 250	511421BT
DPD No. 3 Evo	Tablette / 500	511422BT

Probenahme

1. Bei der Probenvorbereitung muss das Ausgasen, 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 Chlordioxid 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. Stark alkalische oder saure Wässer müssen 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).

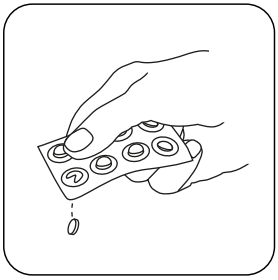
DE

Durchführung der Bestimmung Chlordioxid,neben Chlor, mit Tablette

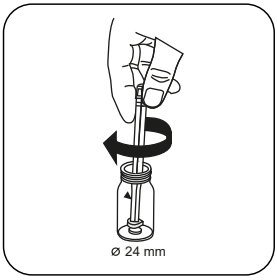
Die Methode im Gerät auswählen.

Wählen Sie zudem die Bestimmung: neben Chlor

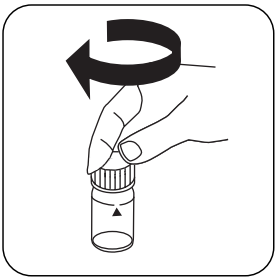
24-mm-Küvette mit **10 mL Probe** füllen.



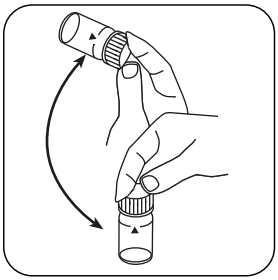
Eine **GLYCINE Tablette** zugeben.



Tablette(n) unter leichter Drehung zerdrücken.

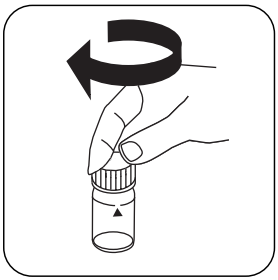


Küvette(n) verschließen.

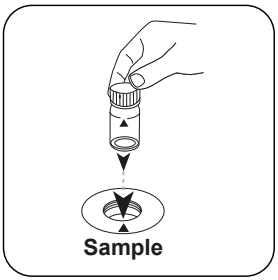


Tablette(n) durch Umschwenken lösen.

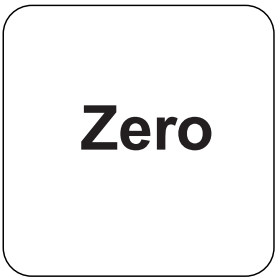
Eine **zweite Küvette** mit **10 mL Probe** füllen.



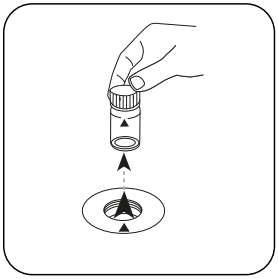
Küvette(n) verschließen.



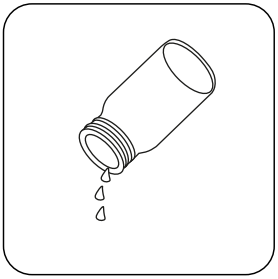
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.



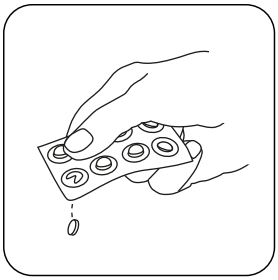
Taste **ZERO** drücken.



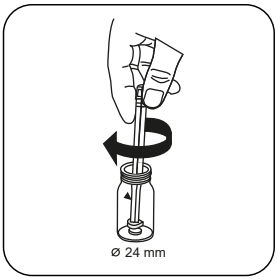
Küvette aus dem Messschacht nehmen.



Küvette entleeren.



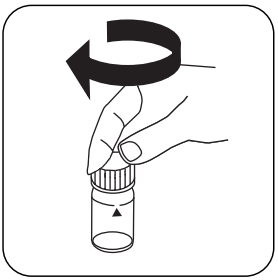
Eine **DPD No. 1 Tablette** zugeben.



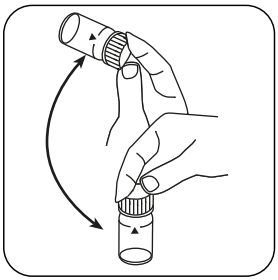
Tablette(n) unter leichter Drehung zerdrücken.

Die vorbereitete **Glycinlösung** in die vorbereitete Küvette füllen.

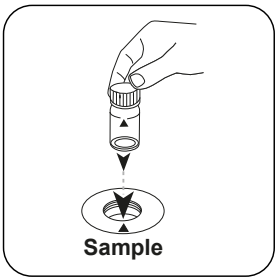
DE



Küvette(n) verschließen.



Tablette(n) durch Umschwenken lösen.



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

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

In der Anzeige erscheint das Ergebnis in mg/L Chlordioxid.

Auswertung

Die folgende Tabelle gibt an wie die ausgegebenen Werte in andere Zitierformen umgewandelt werden können.

Einheit	Zitierform	Umrechnungsfaktor
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Chemische Methode

DPD / Glycin

Appendix

Störungen

Permanente Störungen

1. Alle in den Proben vorhandenen Oxidationsmittel führen zu Mehrbefunden.

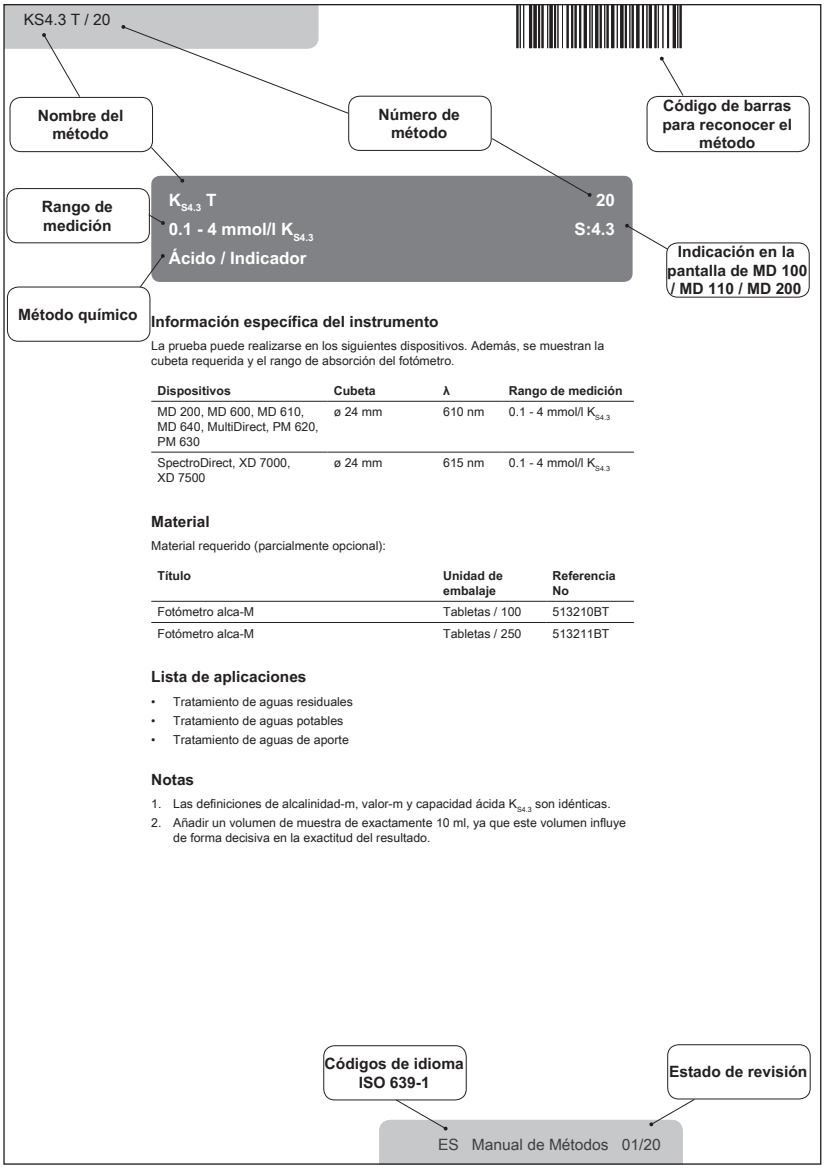
Ausschließbare Störungen

1. Konzentrationen über 19 mg/L Chlordioxid können zu Ergebnissen innerhalb des Messbereiches bis hin zu 0 mg/L führen. In diesem Fall ist die Wasserprobe mit Chlordioxidfreiem Wasser zu verdünnen. 10 ml der verdünnten Probe werden mit Reagenz versetzt und die Messung wiederholt.

Abgeleitet von

DIN 38408, Teil 5

[e)] Hilfsreagenz, alternativ zur DPD No. 1 / No. 3 bei Eintrübungen der Probe durch hohen Calciumionengehalt und/ oder hohe Leitfähigkeit | [f)] Hilfsreagenz, wird zusätzlich für die Bestimmung Brom, Chlordioxid bzw. Ozon benötigt bei Anwesenheit von Chlor | [#] inklusive Rührstab



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	λ	Rango de medición
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

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.

Realización de la determinación

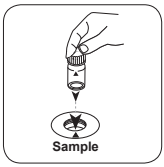
Ejecución de la determinación Capacidad ácida $K_{S4.3}$ con tableta

Seleccionar el método en el aparato.

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

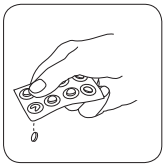
Llenar la cubeta de 24 mm con **10 ml de muestra** .

Cerrar la(s) cubeta(s).

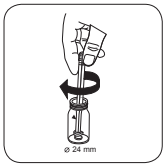


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

• • •



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_2 [a] CL6

DPD

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DPD nº1	Tabletas / 100	511050BT
DPD nº 1	Tabletas / 250	511051BT
DPD nº 1	Tabletas / 500	511052BT
DPD nº 3	Tabletas / 100	511080BT
DPD nº 3	Tabletas / 250	511081BT
DPD nº 3	Tabletas / 500	511082BT
DPD nº 1 High Calcium [e]	Tabletas / 100	515740BT
DPD nº 1 High Calcium [e]	Tabletas / 250	515741BT
DPD nº 1 High Calcium [e]	Tabletas / 500	515742BT
DPD nº 3 High Calcium [e]	Tabletas / 100	515730BT
DPD nº 3 High Calcium [e]	Tabletas / 250	515731BT
DPD nº 3 High Calcium [e]	Tabletas / 500	515732BT
DPD nº 4	Tabletas / 100	511220BT
DPD nº 4	Tabletas / 250	511221BT
DPD nº 4	Tabletas / 500	511222BT
DPD nº 3 Evo	Tabletas / 100	511420BT
DPD nº 3 Evo	Tabletas / 250	511421BT
DPD nº 3 Evo	Tabletas / 500	511422BT
DPD nº4 Evo	Tabletas / 100	511970BT
DPD nº 4 Evo	Tabletas / 250	511971BT
DPD nº 4 Evo	Tabletas / 500	511972BT

Standards disponibles

Título	Unidad de embalaje	No. de referencia
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).

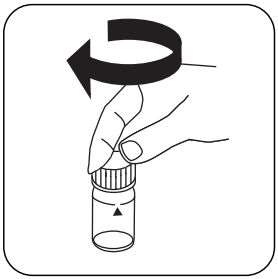
Notas

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).

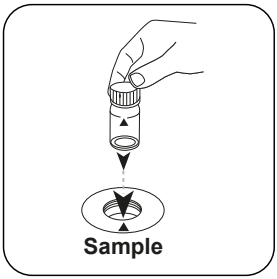
Ejecución de la determinación Cloro libre con tableta

Seleccionar el método en el aparato.

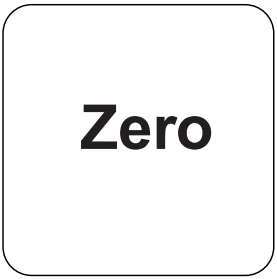
Llenar la cubeta de 24 mm con **10 mL de muestra** .



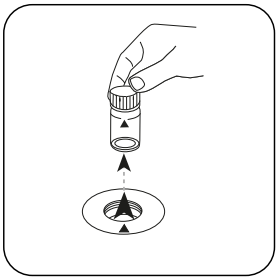
Cerrar la(s) cubeta(s).



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

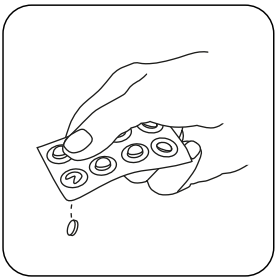


Pulsar la tecla **ZERO**.

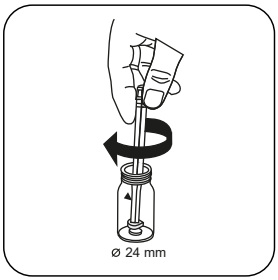


Extraer la cubeta del compartimiento de medición.

Vaciar la cubeta excepto algunas gotas.

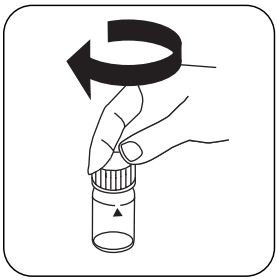


Añadir **tableta DPD No. 1**.

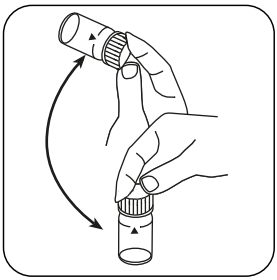


Triturar la(s) tableta(s) girando ligeramente.

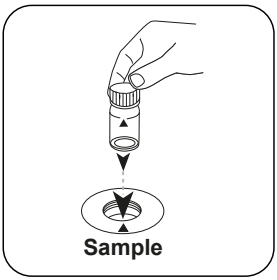
Llenar la cubeta con la **muestra** hasta la **marca de 10 mL** .



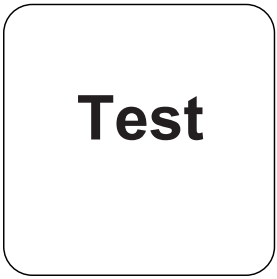
Cerrar la(s) cubeta(s).



Disolver la(s) tableta(s) girando.



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



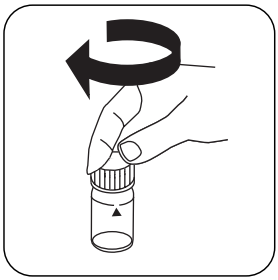
Pulsar la tecla **TEST** (XD: **START**).

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

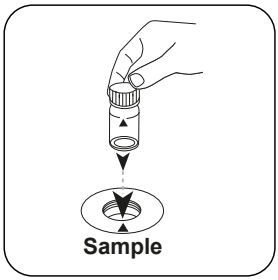
Ejecución de la determinación Cloro total con tableta

Seleccionar el método en el aparato.

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

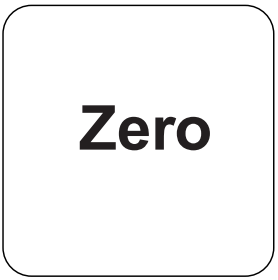


Cerrar la(s) cubeta(s).

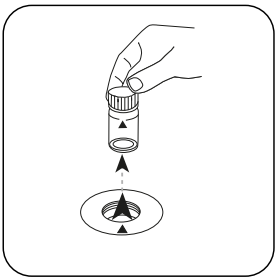


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

ES

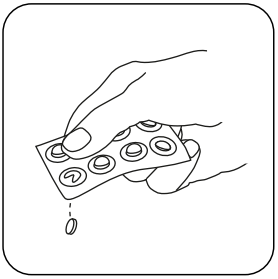


Pulsar la tecla **ZERO**.

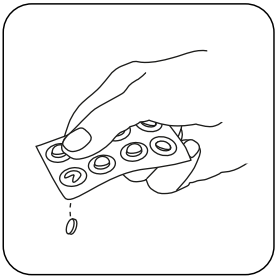


Extraer la cubeta del compartimiento de medición.

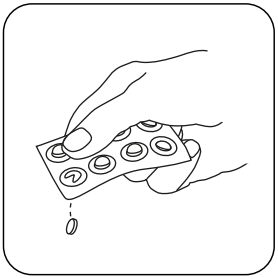
Vaciar la cubeta excepto algunas gotas.



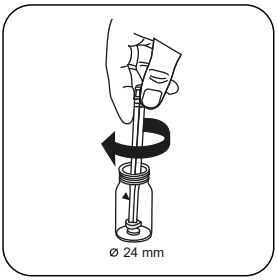
Añadir **tableta DPD No. 1**.



Añadir **tableta DPD No. 3**.

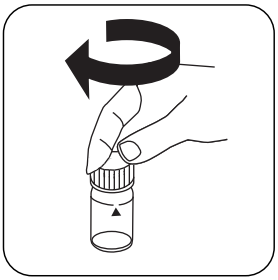


Alternativa a la tableta DPD No 1 y No 3, se puede agregar una tableta DPD No. 4.

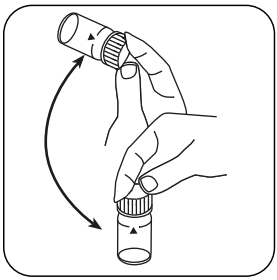


Triturar la(s) tableta(s) girando ligeramente.

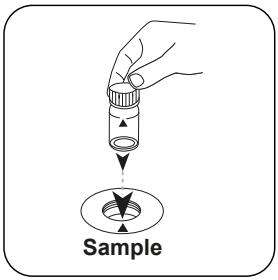
Llenar la cubeta con la **muestra** hasta la **marca de 10 mL** .



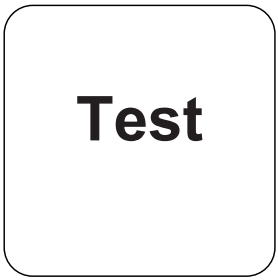
Cerrar la(s) cubeta(s).



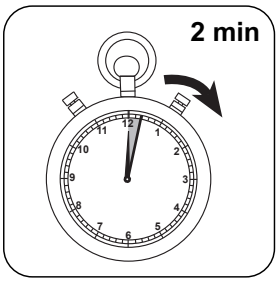
Disolver la(s) tableta(s) girando.



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 extraibles

- 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 nº 1 High Calcium y la tableta reactiva DPD nº 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).

Interferencia	de / [mg/L]
CrO_4^{2-}	0.01
MnO_2	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
Coeficiente de variación	0.87 %

Conforme a

EN ISO 7393-2

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

Cloro L M101

0.02 - 4.0 mg/L Cl_2 [a)] CL6

DPD

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
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

Título	Unidad de embalaje	No. de referencia
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

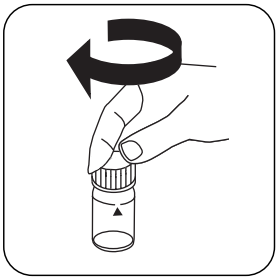
1. Después de usarlas, las botellas cuentagotas deben cerrarse de nuevo inmediatamente con la tapa roscada del mismo color, respectivamente.
2. Guardar el set reactivo a una temperatura entre +6 °C y +10 °C.

ES

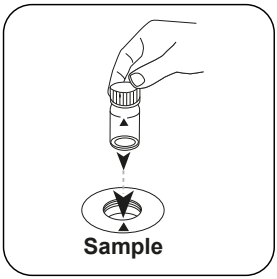
Ejecución de la determinación Cloro libre con reactivos líquidos

Seleccionar el método en el aparato.

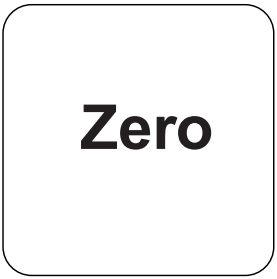
Llenar la cubeta de 24 mm con **10 mL de muestra** .



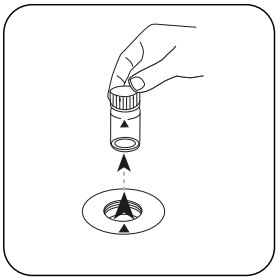
Cerrar la(s) cubeta(s).



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

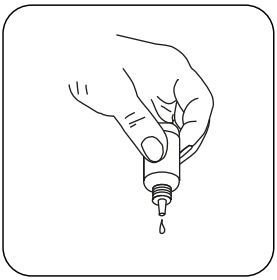


Pulsar la tecla **ZERO**.

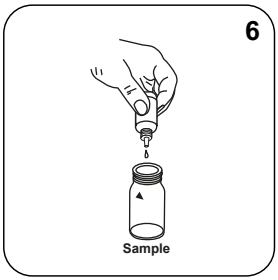


Extraer la cubeta del compartimiento de medición.

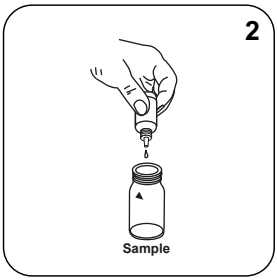
Vaciar la cubeta.



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

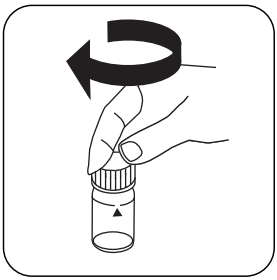


Añadir **6 gotas de DPD 1 Buffer Solution** en la cubeta con la muestra.

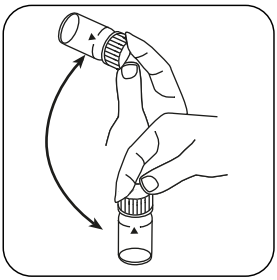


Añadir **2 gotas de DPD 1 Reagent Solution** en la cubeta con la muestra.

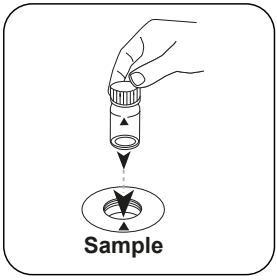
Llenar la cubeta con la **muestra** hasta la **marca de 10 mL** .



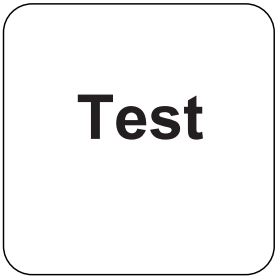
Cerrar la(s) cubeta(s).



Mezclar el contenido girando.



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



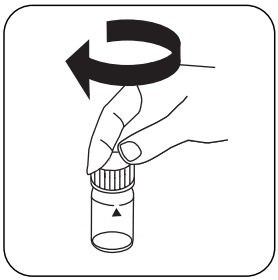
Pulsar la tecla **TEST** (XD: **START**).

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

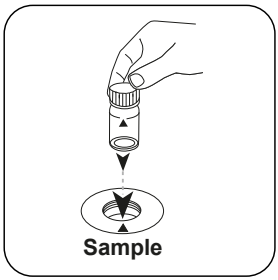
Ejecución de la determinación Cloro total con reactivos líquidos

Seleccionar el método en el aparato.

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

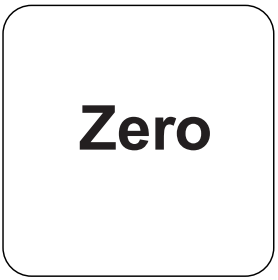


Cerrar la(s) cubeta(s).

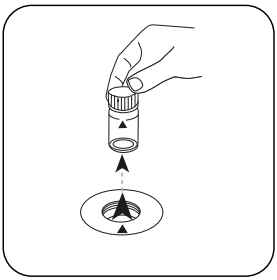


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

ES

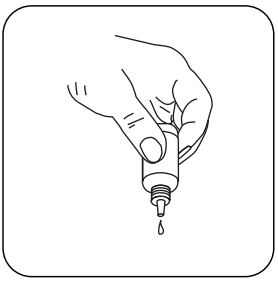


Pulsar la tecla **ZERO**.

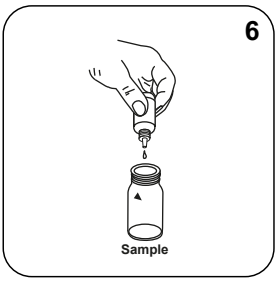


Extraer la cubeta del compartimiento de medición.

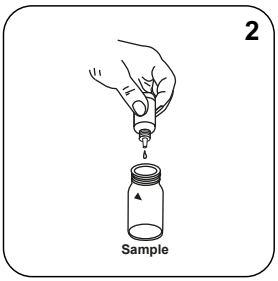
Vaciar la cubeta.



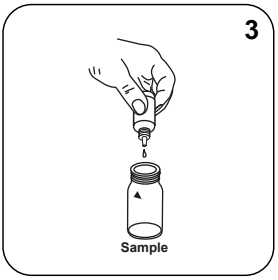
Mantener la botella cuentagotas vertical y añadir gotas del mismo tamaño presionando lentamente.



Añadir **6 gotas de DPD 1 Buffer Solution** en la cubeta con la muestra.

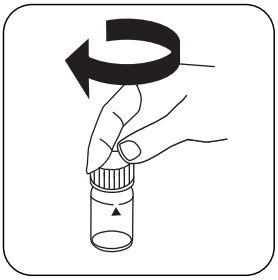


Añadir **2 gotas de DPD 1 Reagent Solution** en la cubeta con la muestra.

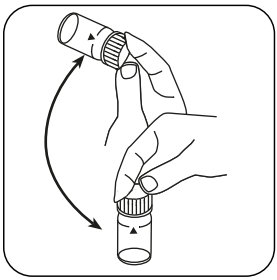


Añadir **3 gotas de DPD 3 Solution** en la cubeta con la muestra.

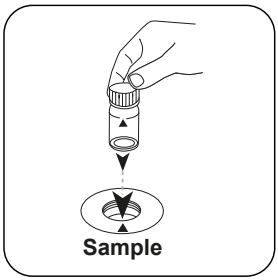
Llenar la cubeta con la **muestra** hasta la **marca de 10 mL** .



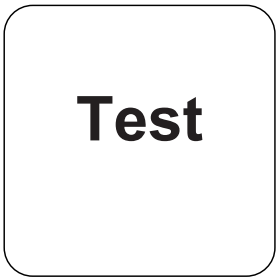
Cerrar la(s) cubeta(s).



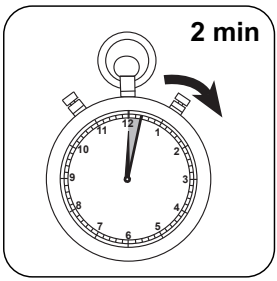
Mezclar el contenido girando.



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



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



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 extraibles

- 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).

Interferencia	de / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conforme a

EN ISO 7393-2

[a)] Posible determinación de libre, combinado, total

Cloro HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI / ácido

ES

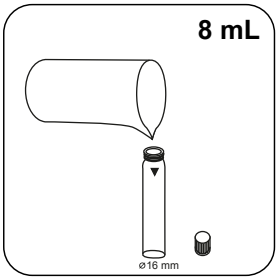
Material

Material requerido (parcialmente opcional):

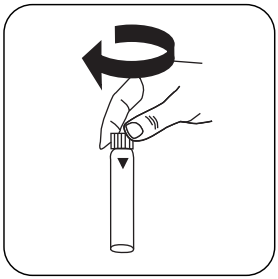
Reactivos	Unidad de embalaje	No. de referencia
Cloro HR (KI)	Tabletas / 100	513000BT
Cloro HR (KI)	Tabletas / 250	513001BT
Acidificante GP	Tabletas / 100	515480BT
Acidificante GP	Tabletas / 250	515481BT
Juego cloro HR (KI)/acidificante GP#	100 cada	517721BT
Juego cloro HR (KI)/acidificante GP#	250 cada	517722BT
Cloro HR (KI)	Tabletas / 100	501210
Cloro HR (KI)	Tabletas / 250	501211

Ejecución de la determinación Cloro HR (KI) con tableta

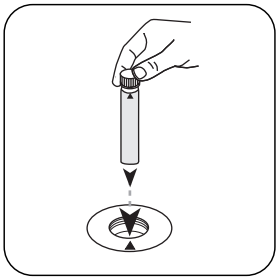
Seleccionar el método en el aparato.



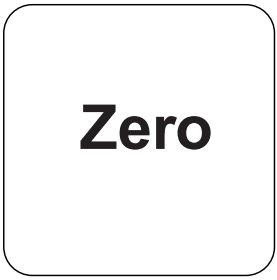
Llenar la cubeta de 16 mm con **8 mL de muestra** .



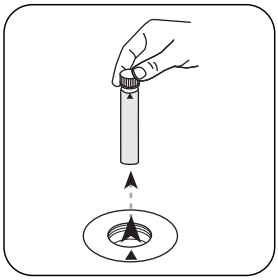
Cerrar la(s) cubeta(s).



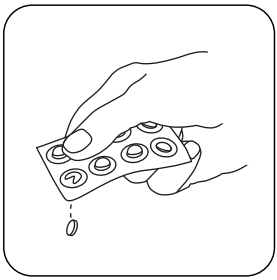
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



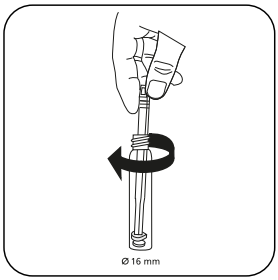
Pulsar la tecla **ZERO**.



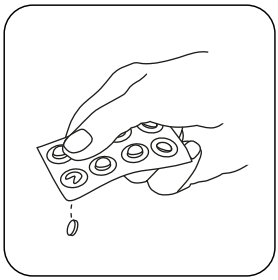
Extraer la **cubeta** del compartimiento de medición.



Añadir **tableta Chlorine HR (KI)**.

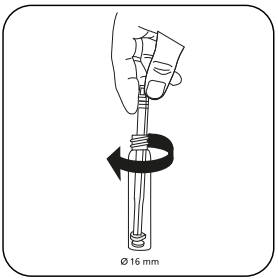


Triturar la(s) tableta(s) girando ligeramente.

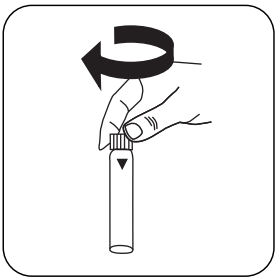


Añadir **tableta ACIDIFYING GP**.

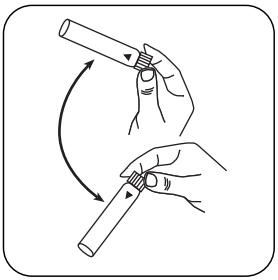
ES



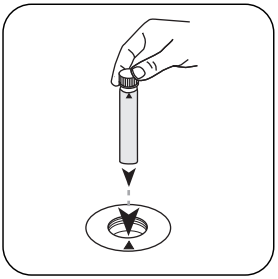
Triturar la(s) tableta(s) girando ligeramente.



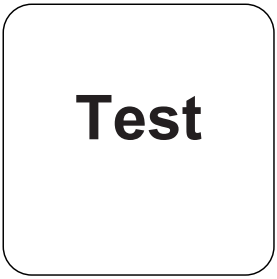
Cerrar la(s) cubeta(s).



Disolver la(s) tableta(s) girando.



Poner la **cubeta de muestra** en el 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.

Método químico

KI / ácido

Apéndice

Interferencia

Interferencias persistentes

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

Validación del método

Límite de detección	1.29 mg/L
Límite de determinación	3.86 mg/L
Límite del rango de medición	200 mg/L
Sensibilidad	83.96 mg/L / Abs
Intervalo de confianza	1.14 mg/L
Desviación estándar	0.45 mg/L
Coeficiente de variación	0.45 %

Derivado de

EN ISO 7393-3

Dióxido de cloro T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / Glicina

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DPD nº1	Tabletas / 100	511050BT
DPD nº 1	Tabletas / 250	511051BT
DPD nº 1	Tabletas / 500	511052BT
DPD nº 3	Tabletas / 100	511080BT
DPD nº 3	Tabletas / 250	511081BT
DPD nº 3	Tabletas / 500	511082BT
Glicina [f)]	Tabletas / 100	512170BT
Glicina [f)]	Tabletas / 250	512171BT
DPD nº 3 High Calcium [e)]	Tabletas / 100	515730BT
DPD nº 3 High Calcium [e)]	Tabletas / 250	515731BT
DPD nº 3 High Calcium [e)]	Tabletas / 500	515732BT
DPD nº 1 High Calcium [e)]	Tabletas / 100	515740BT
DPD nº 1 High Calcium [e)]	Tabletas / 250	515741BT
DPD nº 1 High Calcium [e)]	Tabletas / 500	515742BT
Juego DPD nº 1/nº 3#	100 cada	517711BT
Juego DPD nº 1/nº 3#	250 cada	517712BT
Juego DPD nº 1/glicina #	100 cada	517731BT
Juego DPD nº 1/glicina #	250 cada	517732BT
Juego DPD nº 1/nº 3 High Calcium#	100 cada	517781BT
Juego DPD nº 1/nº 3 High Calcium#	250 cada	517782BT
DPD nº 3 Evo	Tabletas / 100	511420BT
DPD nº 3 Evo	Tabletas / 250	511421BT
DPD nº 3 Evo	Tabletas / 500	511422BT

Muestreo

1. Evitar durante la preparación de la muestra la desgasificación, 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 Dióxido de 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. 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).

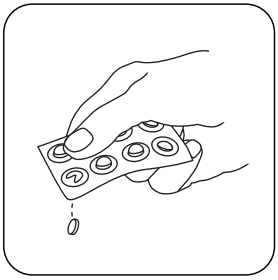
ES

Ejecución de la determinación Dióxido de cloro con tableta, en presencia de cloro

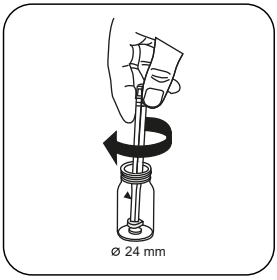
Seleccionar el método en el aparato.

Seleccione además la determinación: junto a cloro

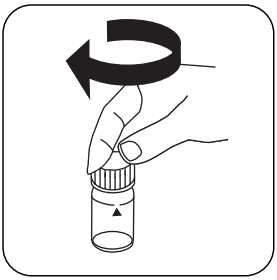
Llenar la cubeta de 24 mm con **10 mL de muestra** .



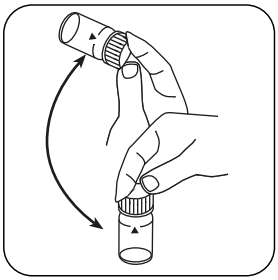
Añadir **tableta GLYCINE**.



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

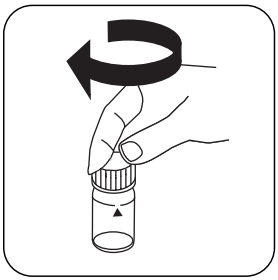


Cerrar la(s) cubeta(s).

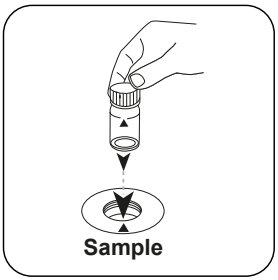


Disolver la(s) tableta(s) girando.

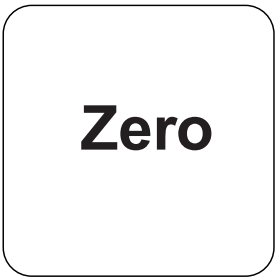
Llenar una **segunda cubeta** con **10 mL de muestra**.



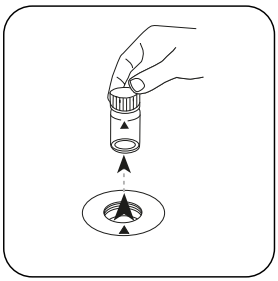
Cerrar la(s) cubeta(s).



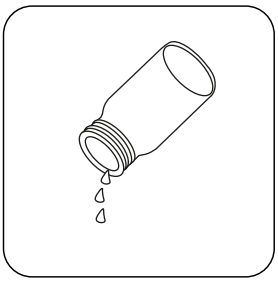
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



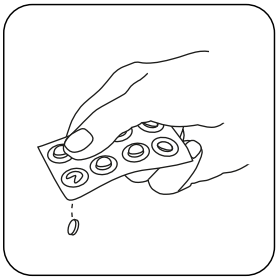
Pulsar la tecla **ZERO**.



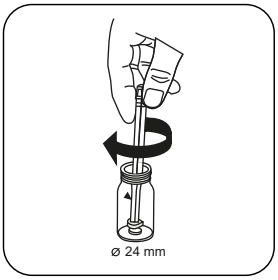
Extraer la cubeta del compartimiento de medición.



Vaciar la cubeta.

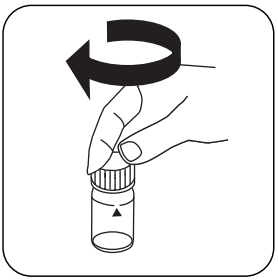


Añadir **tableta DPD No. 1**.

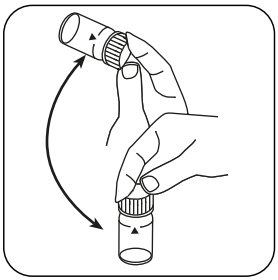


Triturar la(s) tableta(s) girando ligeramente.

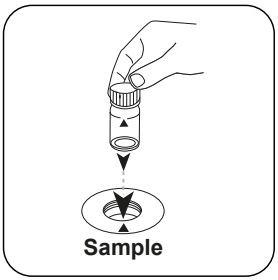
Llenar la **solución de glicina** preparada en la cubeta preparada.



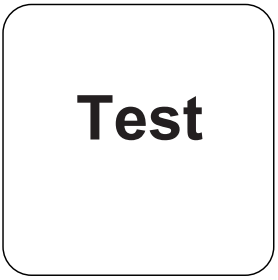
Cerrar la(s) cubeta(s).



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**).

A continuación se visualizará el resultado en mg/L Dióxido de cloro.

Evaluación

La siguiente tabla muestra cómo los valores de salida se pueden convertir a otros formularios de citas.

Unidad	Conversión	Factor de conversión
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Método químico

DPD / Glicina

Apéndice

Interferencia

Interferencias persistentes

1. Todos los elementos oxidantes existentes en la muestra producen un resultado más elevado.

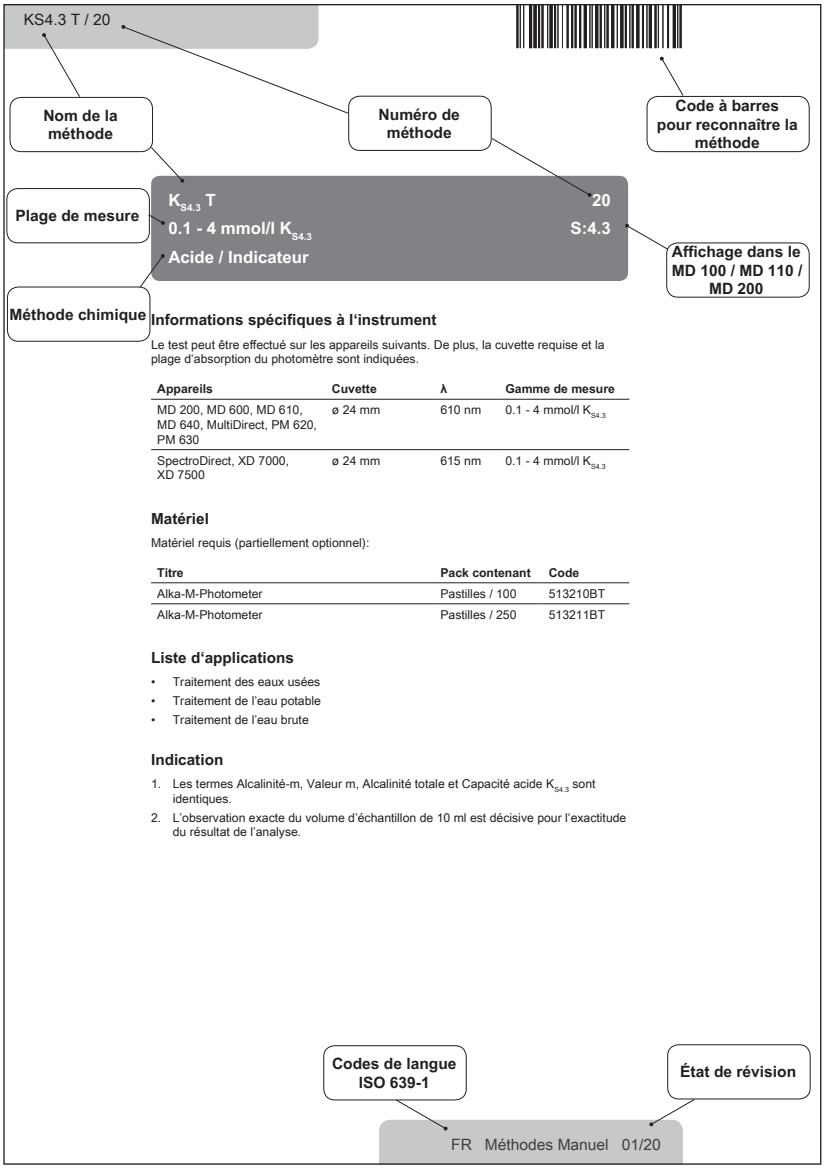
Interferencias extraibles

1. Las concentraciones de dióxido de cloro mayores a 19 mg/L pueden conducir a resultados de dentro del campo de medición hasta 0 mg/L. En este caso, se deberá diluir la muestra acuosa con agua libre de dióxido de cloro. Se mezclan 10 ml de muestra diluida con reactivo y se repite la medición.

Derivado de

DIN 38408, parte 5

[e)] Reactivo auxiliar, alternativo a DPD No.1/3 en enturbiamientos de la prueba debido a concentraciones elevadas de calcio y/o elevada conductividad | [f)] Reactivo auxiliar, necesario adicionalmente para la determinación de bromo, dióxido de cloro y ozono en presencia de cloro



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	λ	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.

Procédure du test

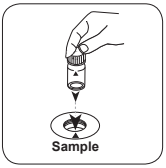
Réalisation de la quantification Capacité acide $K_{S4.3}$ avec pastille

Sélectionnez la méthode sur l'appareil.

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

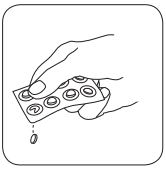
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.

Fermez la(les) cuvette(s).

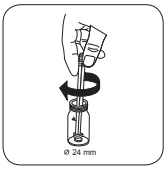


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

• • •



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_2 [a] CL6

DPD

FR

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	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 [e]	Pastilles / 100	515740BT
DPD N° 1 High Calcium [e]	Pastilles / 250	515741BT
DPD N° 1 High Calcium [e]	Pastilles / 500	515742BT
DPD N° 3 High Calcium [e]	Pastilles / 100	515730BT
DPD N° 3 High Calcium [e]	Pastilles / 250	515731BT
DPD N° 3 High Calcium [e]	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

Standards disponibles

Titre	Pack contenant	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 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).

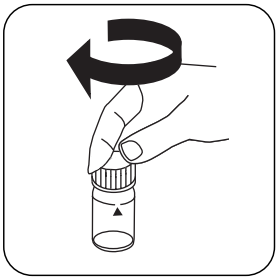
Indication

1. 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).

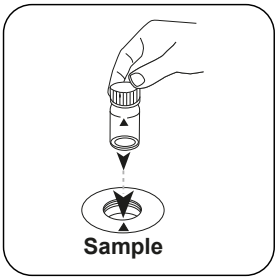
Réalisation de la quantification Chlore libre avec pastilles

Sélectionnez la méthode sur l'appareil.

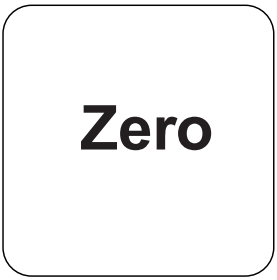
Remplissez une cuvette de 24 mm de **10 mL d'échantillon**.



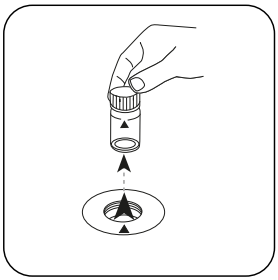
Fermez la(les) cuvette(s).



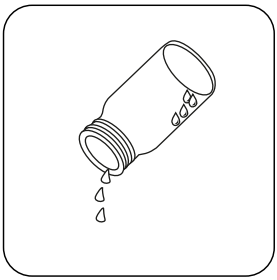
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



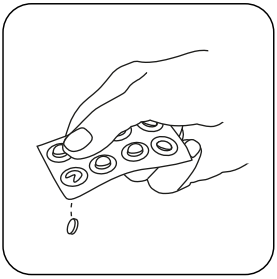
Appuyez sur la touche **ZERO**.



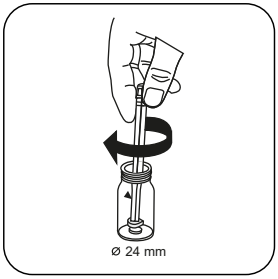
Retirez la cuvette de la chambre de mesure.



Videz pratiquement la cuvette en y laissant quelques gouttes.

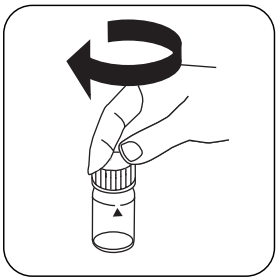


Ajoutez une **pastille de DPD No. 1**.

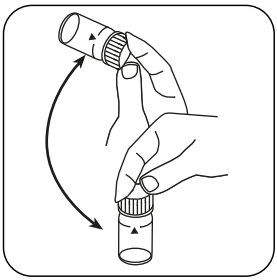


Écrasez la(les) pastille(s) en la(les) tournant un peu.

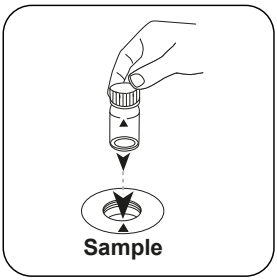
Remplissez la cuvette jusqu'au **repère de 10 mL** en y versant l'**échantillon**.



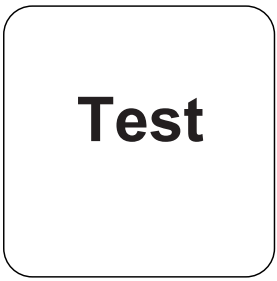
Fermez la(les) cuvette(s).



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.



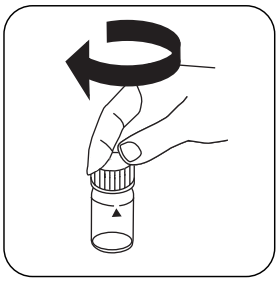
Appuyez sur la touche **TEST** (XD: **START**).

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

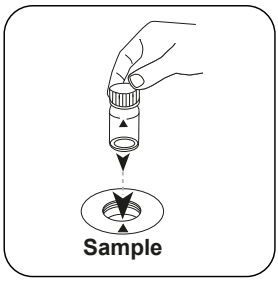
Réalisation de la quantification Chlore total avec pastilles

Sélectionnez la méthode sur l'appareil.

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

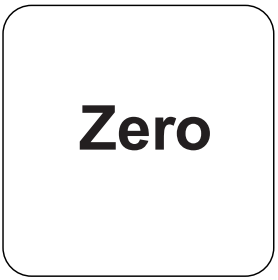


Fermez la(les) cuvette(s).

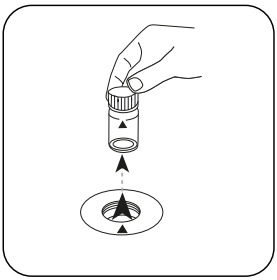


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

FR

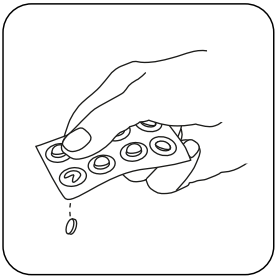


Appuyez sur la touche **ZERO**.

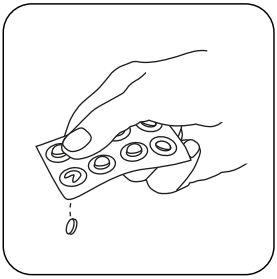


Retirez la cuvette de la chambre de mesure.

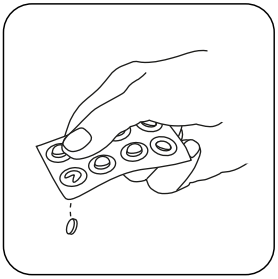
Videz pratiquement la cuvette en y laissant quelques gouttes.



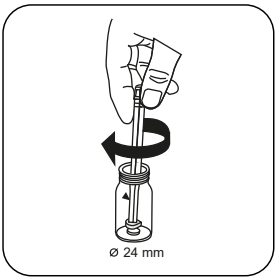
Ajoutez une **pastille de DPD No. 1**.



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

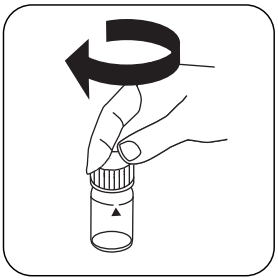


En alternative aux comprimés DPD n ° 1 et n ° 3, un comprimé DPD n ° 4 peut être ajouté.

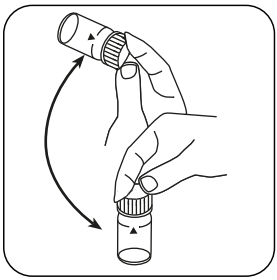


Écrasez la(les) pastille(s) en la(les) tournant un peu.

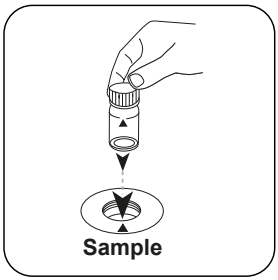
Remplissez la cuvette jusqu'au **repère de 10 mL** en y versant l'**échantillon**.



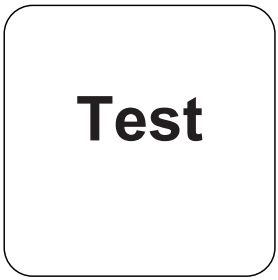
Fermez la(les) cuvette(s).



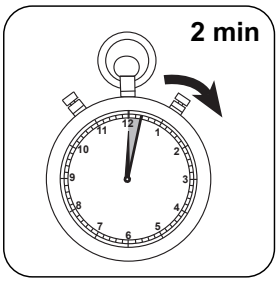
Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.



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



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



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.

FR

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 conductibilité 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).

Interférences	de / [mg/L]
CrO_4^{2-}	0.01
MnO_2	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

[a]Détermination du libre, combiné et total | [e]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_2 [a] CL6

DPD

FR

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
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

Titre	Pack contenant	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 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

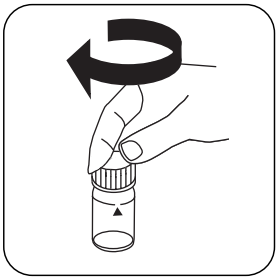
1. Après emploi, refermez immédiatement les flacons compte-goutte en utilisant le capot de même couleur.
2. Conservez le lot de réactif à une température de +6 °C à +10 °C.

Réalisation de la quantification Chlore libre avec réactifs liquides

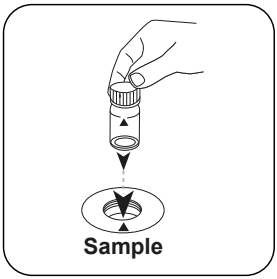
Sélectionnez la méthode sur l'appareil.

FR

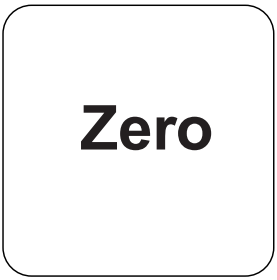
Remplissez une cuvette de 24 mm de **10 mL d'échantillon**.



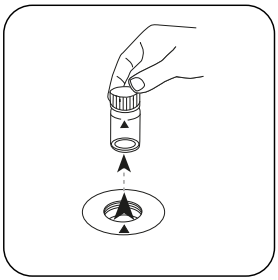
Fermez la(les) cuvette(s).



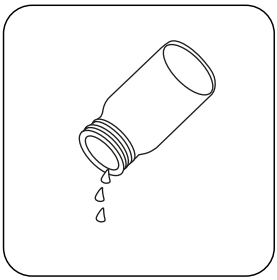
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



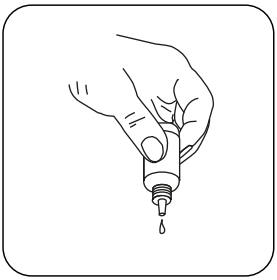
Appuyez sur la touche **ZERO**.



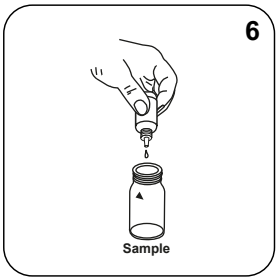
Retirez la cuvette de la chambre de mesure.



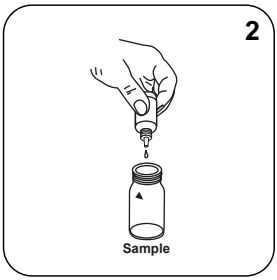
Videz la cuvette.



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

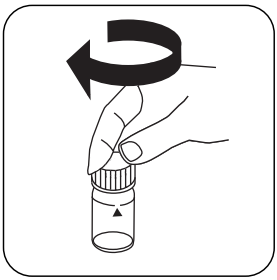


Ajoutez **6 gouttes de DPD 1 Buffer Solution** dans la cuvette réservée à l'échantillon.

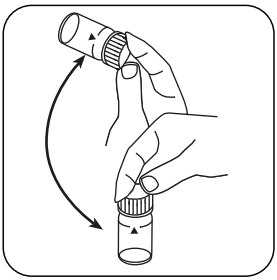


Ajoutez **2 gouttes de DPD 1 Reagent Solution** dans la cuvette réservée à l'échantillon.

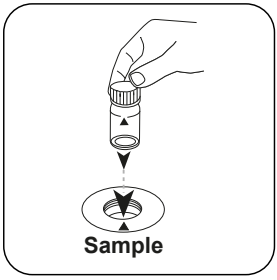
Remplissez la cuvette jusqu'au **repère de 10 mL** en y versant l'**échantillon**.



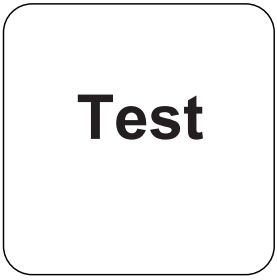
Fermez la(les) cuvette(s).



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.



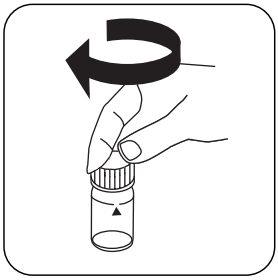
Appuyez sur la touche **TEST** (XD: **START**).

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

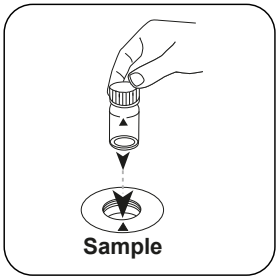
Réalisation de la quantification Chlore total avec réactifs liquides

Sélectionnez la méthode sur l'appareil.

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

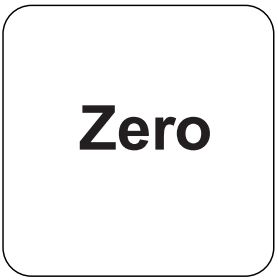


Fermez la(les) cuvette(s).

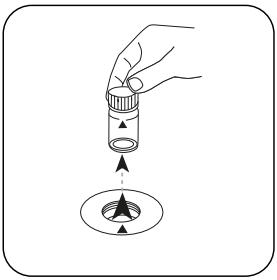


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

FR

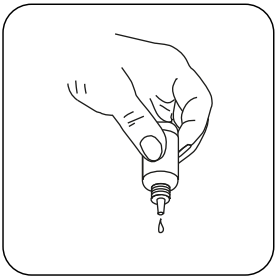


Appuyez sur la touche **ZERO**.

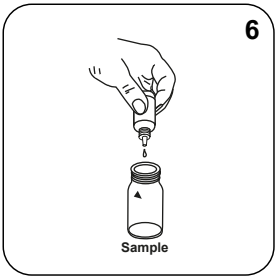


Retirez la cuvette de la chambre de mesure.

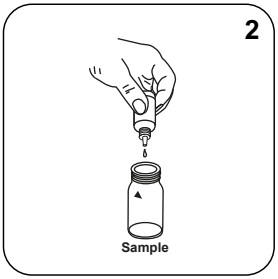
Videz la cuvette.



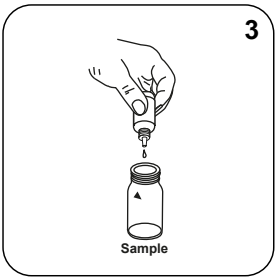
Tenez les flacons compte-goutte à la verticale et ajoutez des gouttes uniformes en appuyant lentement.



Ajoutez **6 gouttes de DPD 1 Buffer Solution** dans la cuvette réservée à l'échantillon.

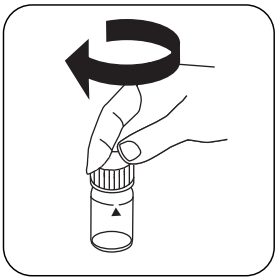


Ajoutez **2 gouttes de DPD 1 Reagent Solution** dans la cuvette réservée à l'échantillon.

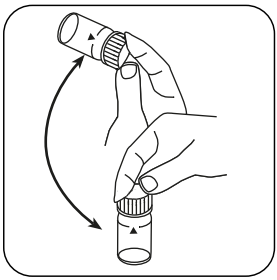


Ajoutez **3 gouttes de DPD 3 Solution** dans la cuvette réservée à l'échantillon.

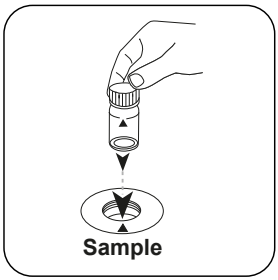
Remplissez la cuvette jusqu'au **repère de 10 mL** en y versant l'**échantillon**.



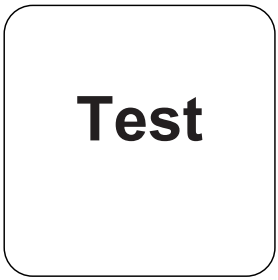
Fermez la(les) cuvette(s).



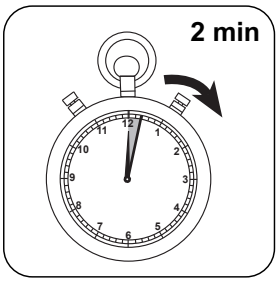
Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.



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



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



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).

Interférences	de / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conformité

EN ISO 7393-2

[a)]Détermination du libre, combiné et total

Chlore HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI / Acide

FR

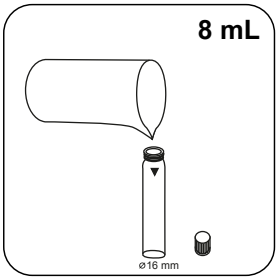
Matériel

Matériel requis (partiellement optionnel):

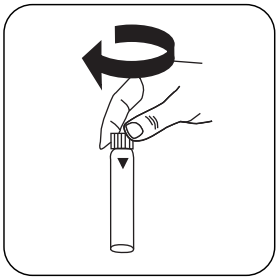
Réactifs	Pack contenant	Code
Chlore HR (KI)	Pastilles / 100	513000BT
Chlore HR (KI)	Pastilles / 250	513001BT
Acidifiants PT	Pastilles / 100	515480BT
Acidifiants PT	Pastilles / 250	515481BT
Kit chlore HR (KI)/acidifiant GP#	100 chacun	517721BT
Kit chlore HR (KI)/acidifiant GP#	250 chacun	517722BT
Chlore HR (KI)	Pastilles / 100	501210
Chlore HR (KI)	Pastilles / 250	501211

Réalisation de la quantification Chlore HR (KI) avec pastille

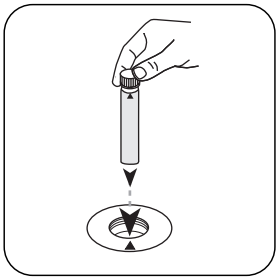
Sélectionnez la méthode sur l'appareil.



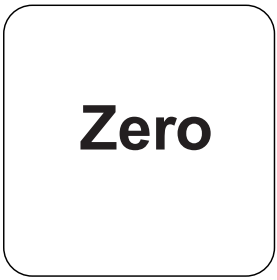
Remplissez une cuvette de 16 mm de **8 mL d'échantillon**.



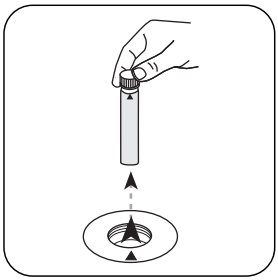
Fermez la(les) cuvette(s).



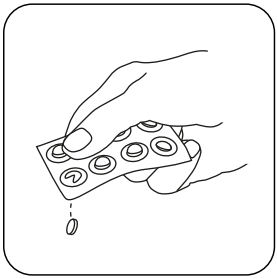
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



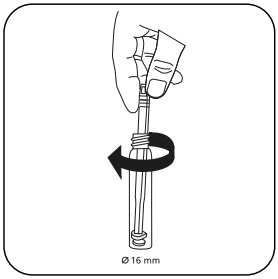
Appuyez sur la touche **ZERO**.



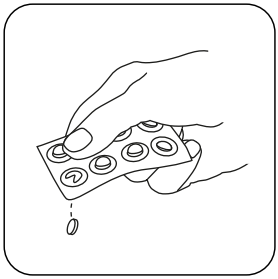
Retirez la **cuvette** de la chambre de mesure.



Ajoutez une **pastille de Chlorine HR (KI)**.

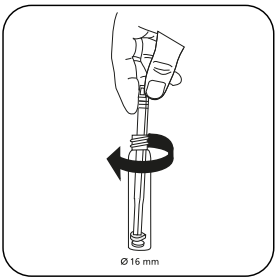


Écrasez la(les) pastille(s) en la(les) tournant un peu.

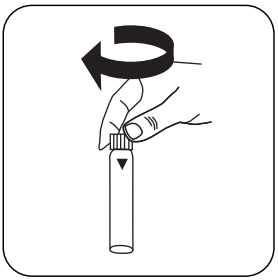


Ajoutez une **pastille de ACIDIFYING GP**.

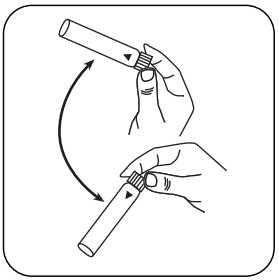
FR



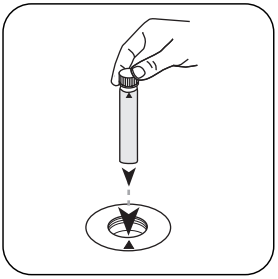
Écrasez la(les) pastille(s) en la(les) tournant un peu.



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**).

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

Méthode chimique

KI / Acide

Appendice

Interférences

Interférences persistantes

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

Méthode Validation

Limite de détection	1.29 mg/L
Limite de détermination	3.86 mg/L
Fin de la gamme de mesure	200 mg/L
Sensibilité	83.96 mg/L / Abs
Intervalle de confiance	1.14 mg/L
Déviation standard	0.45 mg/L
Coefficient de variation	0.45 %

Dérivé de

EN ISO 7393-3

[1] # agitateur inclus

Dioxyde de chlore T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / Glycine

FR

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	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
Glycine [f)]	Pastilles / 100	512170BT
Glycine [f)]	Pastilles / 250	512171BT
DPD N° 3 High Calcium [e)]	Pastilles / 100	515730BT
DPD N° 3 High Calcium [e)]	Pastilles / 250	515731BT
DPD N° 3 High Calcium [e)]	Pastilles / 500	515732BT
DPD N° 1 High Calcium [e)]	Pastilles / 100	515740BT
DPD N° 1 High Calcium [e)]	Pastilles / 250	515741BT
DPD N° 1 High Calcium [e)]	Pastilles / 500	515742BT
Kit DPD N° 1/N° 3#	100 chacun	517711BT
Kit DPD N° 1/N° 3#	250 chacun	517712BT
Kit DPD N° 1/Glycine #	100 chacun	517731BT
Kit DPD N° 1/Glycine #	250 chacun	517732BT
Kit DPD N° 1/N° 3 High Calcium#	100 chacun	517781BT
Kit DPD N° 1/N° 3 High Calcium#	250 chacun	517782BT
DPD N° 3 Evo	Pastilles / 100	511420BT
DPD N° 3 Evo	Pastilles / 250	511421BT
DPD N° 3 Evo	Pastilles / 500	511422BT

Échantillonnage

1. Lors de la préparation de l'échantillon, il faudra éviter le dégazage, 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 Dioxyde de 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. Avant l'analyse, les eaux fortement alcalines ou acides devraient être 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).

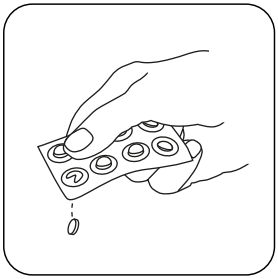
FR

Réalisation de la quantification Dioxyde de chlore, en présence de chlore avec pastille

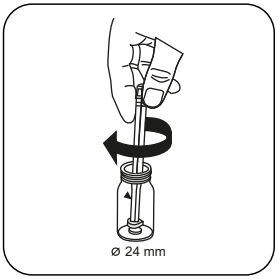
Sélectionnez la méthode sur l'appareil.

Sélectionnez également la quantification : en présence de chlore

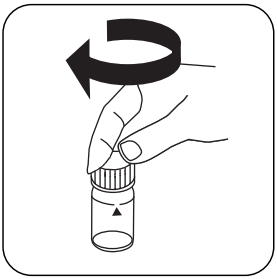
Remplissez une cuvette de 24 mm de **10 mL d'échantillon**.



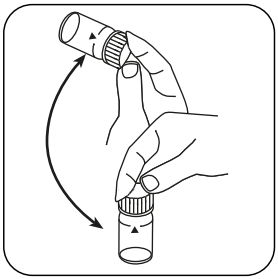
Ajoutez une **pastille de GLYCINE**.



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

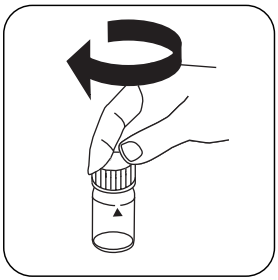


Fermez la(les) cuvette(s).

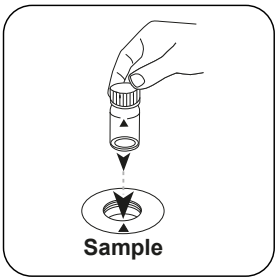


Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.

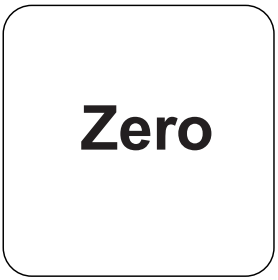
Remplissez une **deuxième cuvette** de **10 mL d'échantillon**.



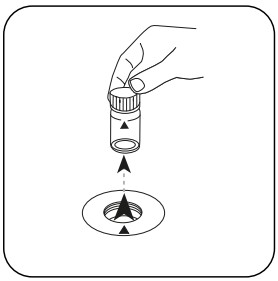
Fermez la(les) cuvette(s).



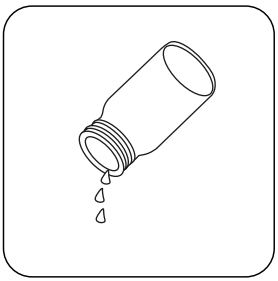
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



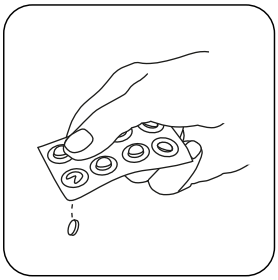
Appuyez sur la touche **ZERO**.



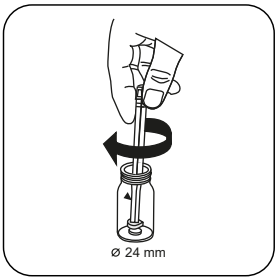
Retirez la cuvette de la chambre de mesure.



Videz la cuvette.

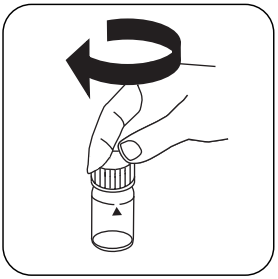


Ajoutez une **pastille de DPD No. 1**.

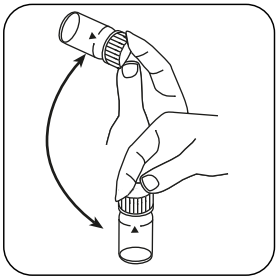


Écrasez la(les) pastille(s) en la(les) tournant un peu.

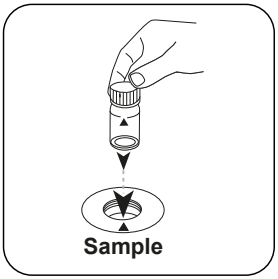
Versez la **solution de Glycine** préparée dans la cuvette préparée.



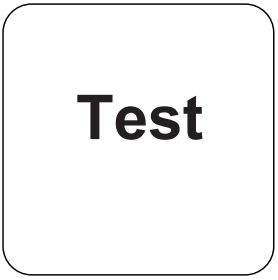
Fermez la(les) cuvette(s).



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**).

Le résultat s'affiche à l'écran en mg/L dioxyde de chlore.

Analyses

Le tableau suivant identifie les valeurs de sortie qui peuvent être converties en d'autres formes de citation.

Unité	Formes de citation	Facteur de conversion
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Méthode chimique

DPD / Glycine

Appendice

Interférences

Interférences persistantes

1. Les agents oxydants contenus dans les échantillons entraînent tous des résultats plus élevés.

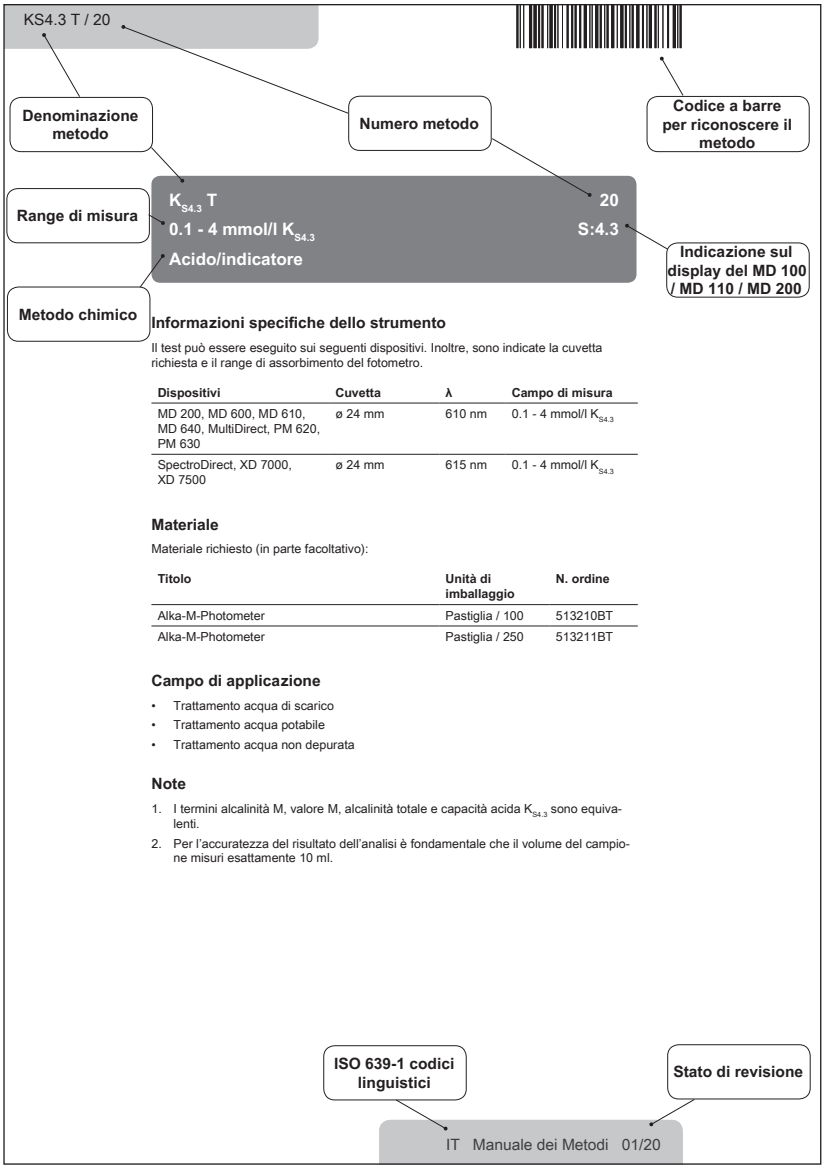
Interférences exclues

1. Les concentrations de dioxyde de chlore supérieures à 19 mg/L peuvent donner des résultats dans la plage de mesure allant jusqu'à 0 mg/L. Dans ce cas, diluez l'échantillon d'eau en utilisant de l'eau exempte de dioxyde de chlore. Le réactif est ajouté à 10 ml d'échantillon dilué. Ensuite, la mesure est répétée.

Dérivé de

DIN 38408, 5è partie

[e] 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 | [9] nécessaire pour la détermination de brome, dioxyde de chlore et ozone en présence de chlore | [3] # agitateur inclus


KS4.3 T / 20
Denominazione metodo
Numero metodo
Codice a barre per riconoscere il metodo
Range di misura
$K_{S4.3}$ T
20
0.1 - 4 mmol/l $K_{S4.3}$
S:4.3
Acido/indicatore
Indicazione sul display del MD 100 / MD 110 / MD 200
Metodo chimico
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 | λ | 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 $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500 | ø 24 mm | 615 nm | 0.1 - 4 mmol/l $K_{S4.3}$
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 $K_{S4.3}$ 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

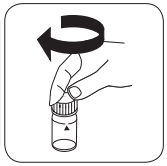
Svolgimento della misurazione

Esecuzione della rilevazione Capacità acida $K_{S4.3}$ con pastiglia

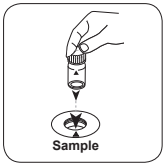
Selezionare il metodo nel dispositivo.

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**.



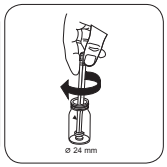
Chiudere la/e cuvetta/e.



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_2 [a] CL6

DPD

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
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 [e]	Pastiglia / 100	515740BT
DPD No. 1 Alto Calcio [e]	Pastiglia / 250	515741BT
DPD No. 1 Alto Calcio [e]	Pastiglia / 500	515742BT
DPD No. 3 High Calcium [e]	Pastiglia / 100	515730BT
DPD No. 3 High Calcium [e]	Pastiglia / 250	515731BT
DPD No. 3 High Calcium [e]	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

Standards disponibles

Titolo	Unità di imballaggio	N. ordine
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 detergenti 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).

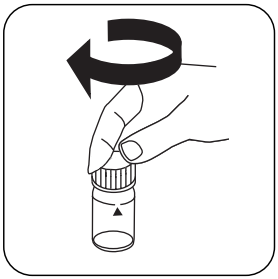
Note

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

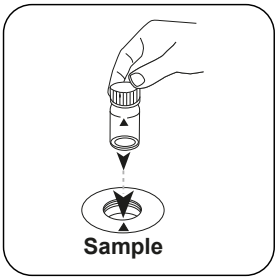
Esecuzione della rilevazione Cloro, libero con compressa

Selezionare il metodo nel dispositivo.

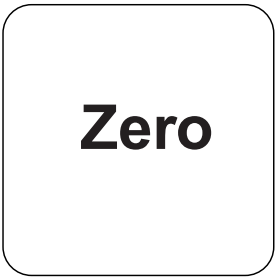
Riempire una cuvetta da 24 mm con **10 mL di campione**.



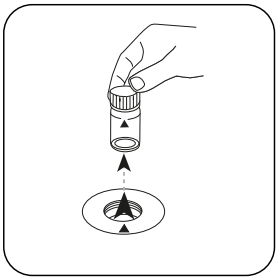
Chiudere la/e cuvetta/e.



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

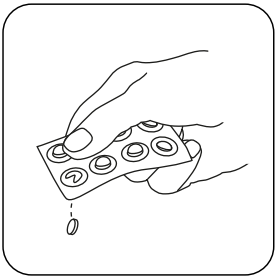


Premere il tasto **ZERO**.

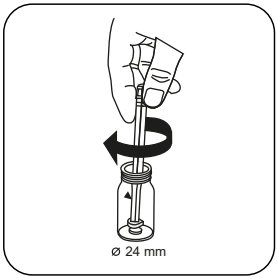


Prelevare la cuvetta dal vano di misurazione.

Svuotare la cuvetta finché non rimangono alcune gocce.

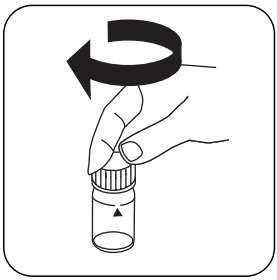


Aggiungere **una pastiglia DPD No. 1**.

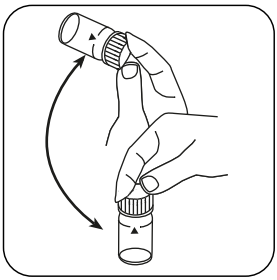


Frantumare la/e pastiglia/e con una leggera rotazione.

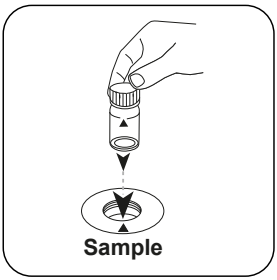
Immettere il **campione** nella cuvetta fino a raggiungere **la tacca dei 10 mL** .



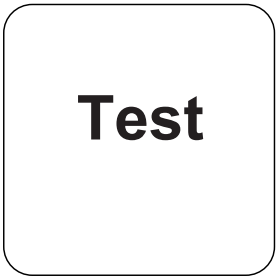
Chiudere la/e cuvetta/e.



Far sciogliere la/e pastiglia/e agitando.



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



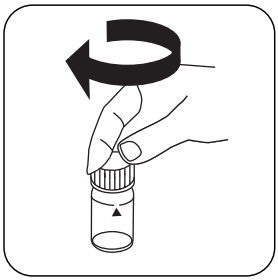
Premere il tasto **TEST** (XD: **START**).

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

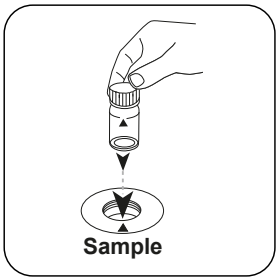
Esecuzione della rilevazione Cloro, totale con compressa

Selezionare il metodo nel dispositivo.

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

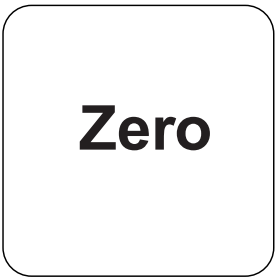


Chiudere la/e cuvetta/e.

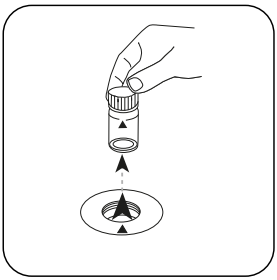


Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

IT

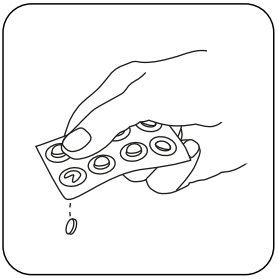


Premere il tasto **ZERO**.

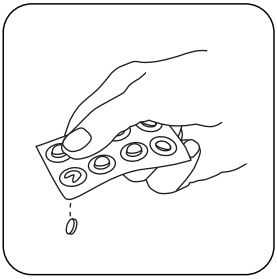


Prelevare la cuvetta dal vano di misurazione.

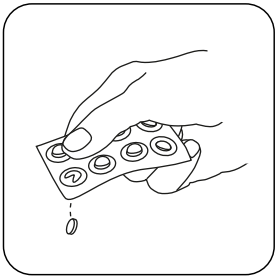
Svuotare la cuvetta finché non rimangono alcune gocce.



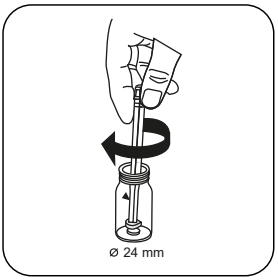
Aggiungere **una pastiglia DPD No. 1**.



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

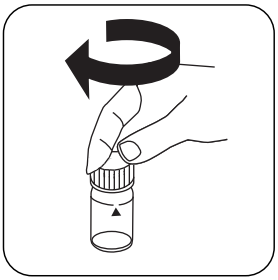


In alternativa al DPD No. 1 e No. 3 tablet, un DPD No. 4 tablet può essere aggiunto.

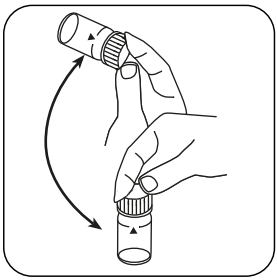


Frantumare la/e pastiglia/e con una leggera rotazione.

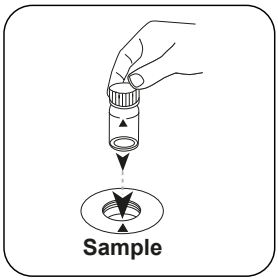
Immettere il **campione** nella cuvetta fino a raggiungere **la tacca dei 10 mL** .



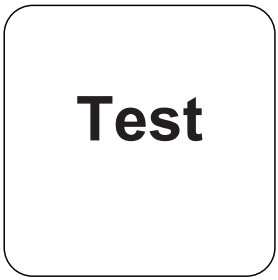
Chiudere la/e cuvetta/e.



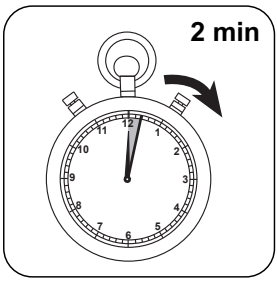
Far sciogliere la/e pastiglia/e agitando.



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).

Interferenze	da / [mg/L]
CrO_4^{2-}	0.01
MnO_2	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

[a]Determinazione di libero, vincolato, totale possibile | [e]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

Cloro L M101

0.02 - 4.0 mg/L Cl_2 [a)] CL6

DPD

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
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

Titolo	Unità di imballaggio	N. ordine
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 detergenti 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).

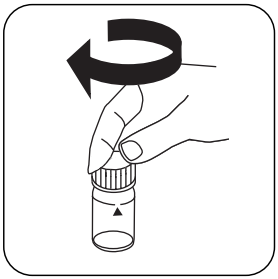
Note

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.

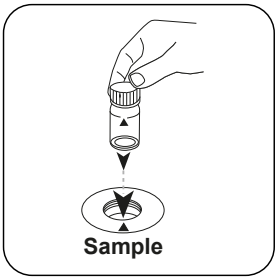
Esecuzione della rilevazione Cloro, libero con reagente liquido

Selezionare il metodo nel dispositivo.

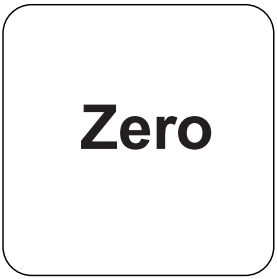
Riempire una cuvetta da 24 mm con **10 mL di campione**.



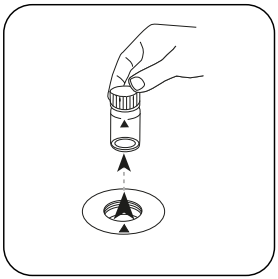
Chiudere la/e cuvetta/e.



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

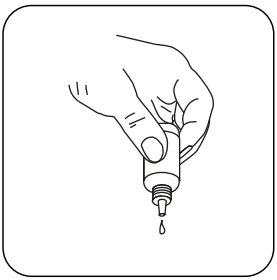


Premere il tasto **ZERO**.

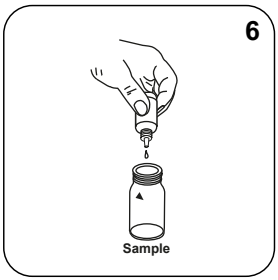


Prelevare la cuvetta dal vano di misurazione.

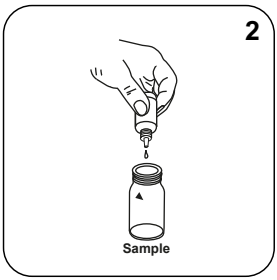
Svuotare la cuvetta.



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

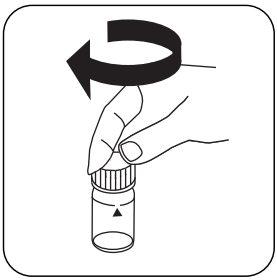


Introdurre **6 gocce di DPD 1 Buffer Solution** nella cuvetta del campione.

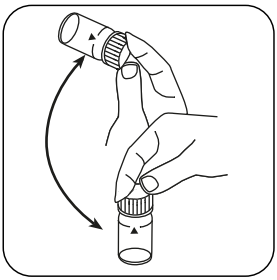


Introdurre **2 gocce di DPD 1 Reagent Solution** nella cuvetta del campione.

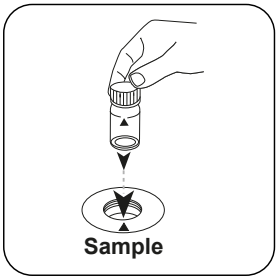
Immettere il **campione** nella cuvetta fino a raggiungere **la tacca dei 10 mL** .



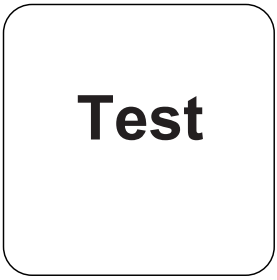
Chiudere la/e cuvetta/e.



Miscelare il contenuto capovolgendo.



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



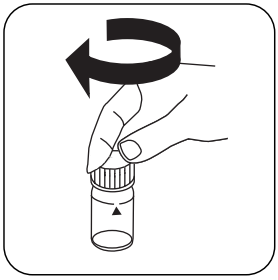
Premere il tasto **TEST** (XD: **START**).

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

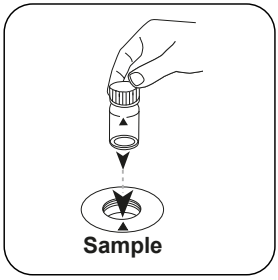
Esecuzione della rilevazione Cloro, totale con reagente liquido

Selezionare il metodo nel dispositivo.

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

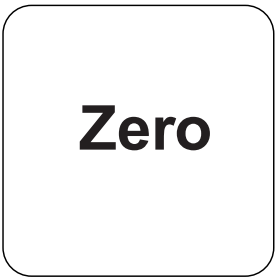


Chiudere la/e cuvetta/e.

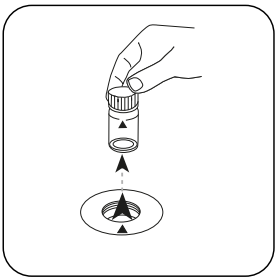


Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

IT

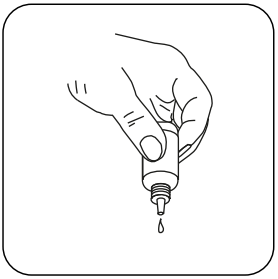


Premere il tasto **ZERO**.

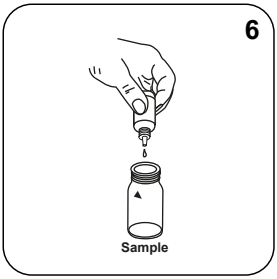


Prelevare la cuvetta dal vano di misurazione.

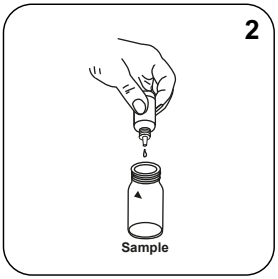
Svuotare la cuvetta.



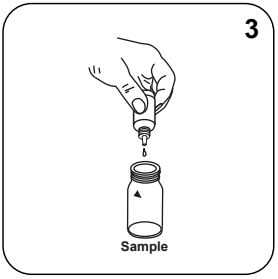
Tenere le boccette contagocce in posizione verticale e introdurre, premendo lentamente, gocce della stessa dimensione nella cuvetta.



Introdurre **6 gocce di DPD 1 Buffer Solution** nella cuvetta del campione.

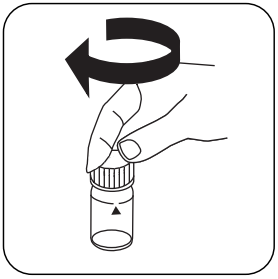


Introdurre **2 gocce di DPD 1 Reagent Solution** nella cuvetta del campione.

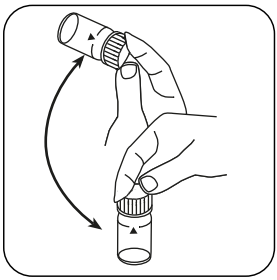


Introdurre **3 gocce di DPD 3 Solution** nella cuvetta del campione.

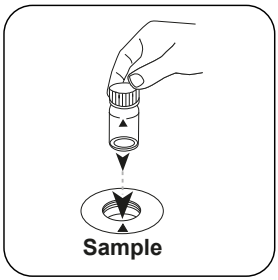
Immettere il **campione** nella cuvetta fino a raggiungere **la tacca dei 10 mL** .



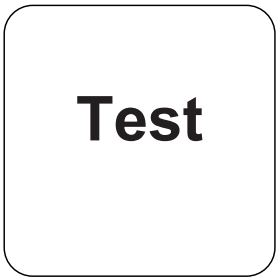
Chiudere la/e cuvetta/e.



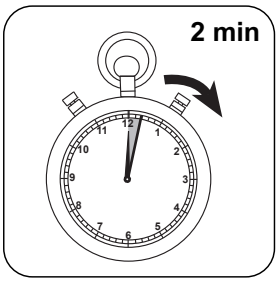
Miscelare il contenuto capovolgendo.



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).

Interferenze	da / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conforme

EN ISO 7393-2

[a)]Determinazione di libero, vincolato, totale possibile

Cloro HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI/acido

IT

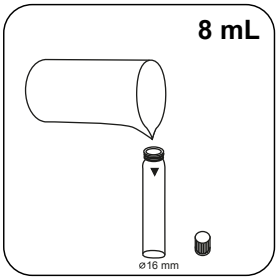
Materiale

Materiale richiesto (in parte facoltativo):

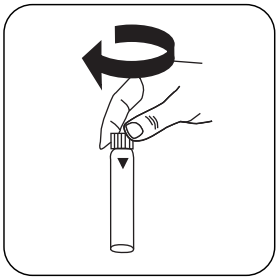
Reagenti	Unità di imballaggio	N. ordine
Cloro HR (KI)	Pastiglia / 100	513000BT
Cloro HR (KI)	Pastiglia / 250	513001BT
Acidificante GP	Pastiglia / 100	515480BT
Acidificante GP	Pastiglia / 250	515481BT
Set Cloro HR (KI)/Acidificante GP#	ciascuna 100	517721BT
Set Cloro HR (KI)/Acidificante GP#	ciascuna 250	517722BT
Cloro HR (KI)	Pastiglia / 100	501210
Cloro HR (KI)	Pastiglia / 250	501211

Esecuzione della rilevazione Cloro HR (KI) con pastiglia

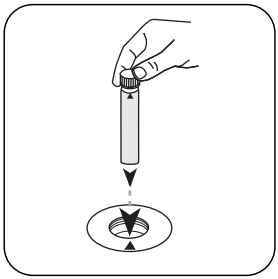
Selezionare il metodo nel dispositivo.



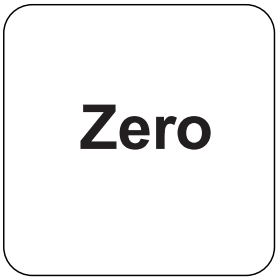
Riempire una cuvetta da 16 mm con **8 mL di campione**.



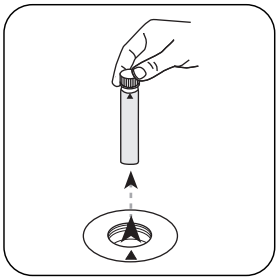
Chiudere la/e cuvetta/e.



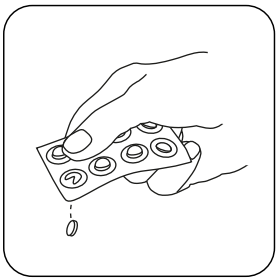
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



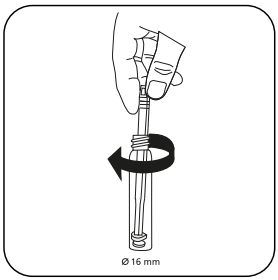
Premere il tasto **ZERO**.



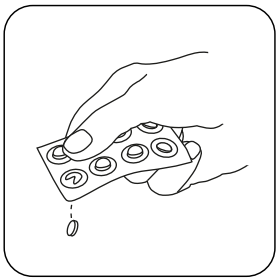
Prelevare la **cuvetta** dal vano di misurazione.



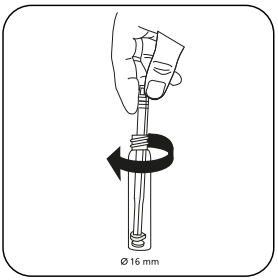
Aggiungere **una pastiglia Chlorine HR (KI)**.



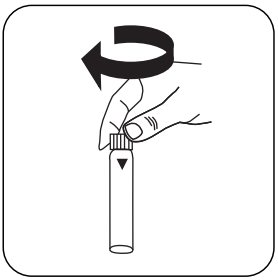
Frantumare la/e pastiglia/e con una leggera rotazione.



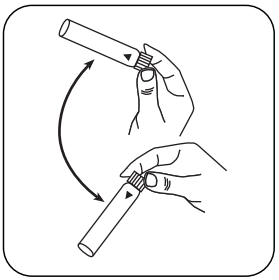
Aggiungere **una pastiglia ACIDIFYING GP**.



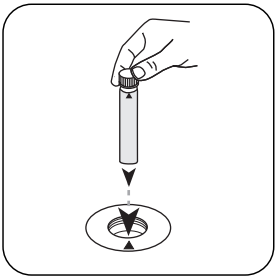
Frantumare la/e pastiglia/e con una leggera rotazione.



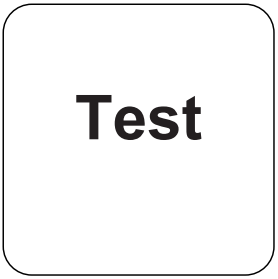
Chiudere la/e cuvetta/e.



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 in mg/L di Cloro.

Metodo chimico

KI/acido

Appendice

Interferenze

Interferenze permanenti

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

Validazione metodo

Limite di rilevabilità	1.29 mg/L
Limite di quantificazione	3.86 mg/L
Estremità campo di misura	200 mg/L
Sensibilità	83.96 mg/L / Abs
Intervallo di confidenza	1.14 mg/L
Deviazione standard della procedura	0.45 mg/L
Coefficiente di variazione della procedura	0.45 %

Derivato di

EN ISO 7393-3

[1] #Bacchetta compresa

Biossido di cloro T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD/glicina

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
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
Glicina [f)]	Pastiglia / 100	512170BT
Glicina [f)]	Pastiglia / 250	512171BT
DPD No. 3 High Calcium [e)]	Pastiglia / 100	515730BT
DPD No. 3 High Calcium [e)]	Pastiglia / 250	515731BT
DPD No. 3 High Calcium [e)]	Pastiglia / 500	515732BT
DPD No. 1 Alto Calcio [e)]	Pastiglia / 100	515740BT
DPD No. 1 Alto Calcio [e)]	Pastiglia / 250	515741BT
DPD No. 1 Alto Calcio [e)]	Pastiglia / 500	515742BT
Set DPD No. 1/no. 3#	ciascuna 100	517711BT
Set DPD No. 1/no. 3#	ciascuna 250	517712BT
Set DPD No. 1/glicina #	ciascuna 100	517731BT
Set DPD No. 1/glicina #	ciascuna 250	517732BT
Set DPD No. 1/no. 3 High Calcium#	ciascuna 100	517781BT
Set DPD No. 1/no. 3 High Calcium#	ciascuna 250	517782BT
DPD No. 3 Evo	Pastiglia / 100	511420BT
DPD No. 3 Evo	Pastiglia / 250	511421BT
DPD No. 3 Evo	Pastiglia / 500	511422BT

Prelievo del campione

1. Nella preparazione del campione occorre evitare la degassificazione, 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 detergenti ad uso domestico (ad es. detersivo per piatti) contengono sostanze riducenti, nella rilevazione del Biossido di 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. Le acque fortemente alcaline o acide 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).

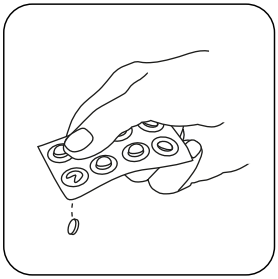
IT

Esecuzione della rilevazione Biossido di cloro, in presenza di cloro con pastiglia

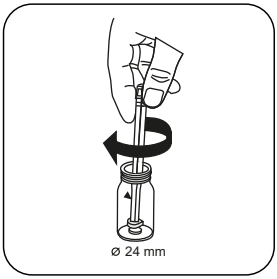
Selezionare il metodo nel dispositivo.

Selezionare inoltre la determinazione: in presenza di Cloro

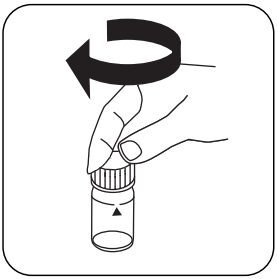
Riempire una cuvetta da 24 mm con **10 mL di campione**.



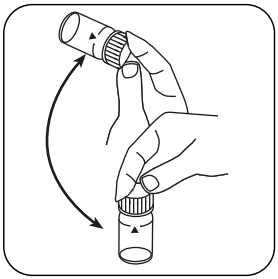
Aggiungere **una pastiglia GLYCINE**.



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

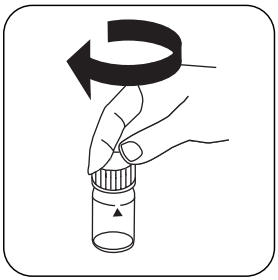


Chiudere la/e cuvetta/e.

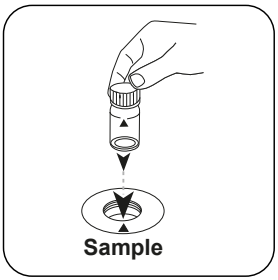


Far sciogliere la/e pastiglia/e agitando.

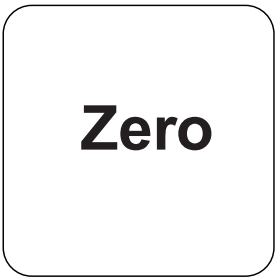
Riempire una **seconda cuvetta** con **10 mL di campione**.



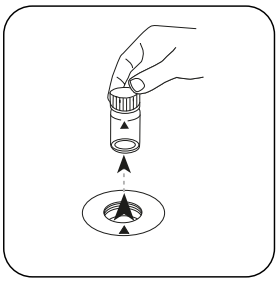
Chiudere la/e cuvetta/e.



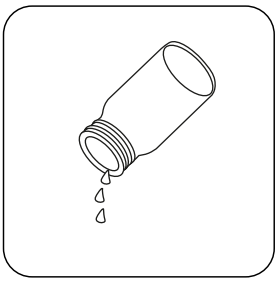
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



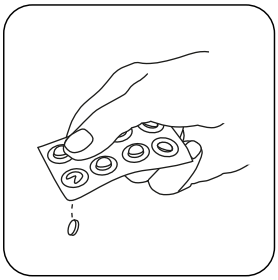
Premere il tasto **ZERO**.



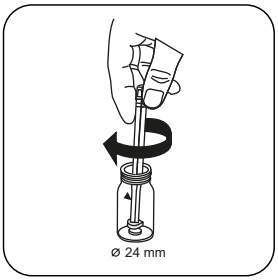
Prelevare la cuvetta dal vano di misurazione.



Svuotare la cuvetta.

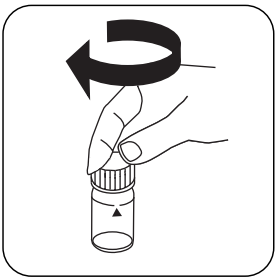


Aggiungere **una pastiglia DPD No. 1**.

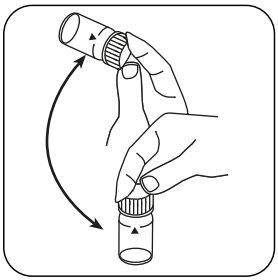


Frantumare la/e pastiglia/e con una leggera rotazione.

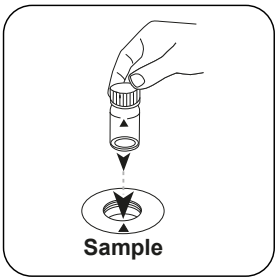
Immettere la **soluzione di glicina** preparata nella cuvetta preparata.



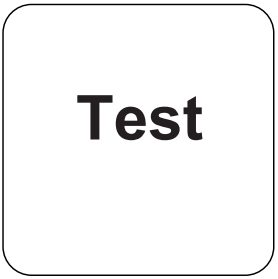
Chiudere la/e cuvetta/e.



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 in mg/L di Biossido di cloro.

Valutazione

La seguente tabella identifica i valori di output che possono essere convertiti in altre forme di citazione.

Unità di misura	Forma di citazione	Fattore di conversione
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Metodo chimico

DPD/glicina

Appendice

Interferenze

Interferenze permanenti

1. Tutti gli ossidanti presenti nei campioni danno risultati troppo elevati.

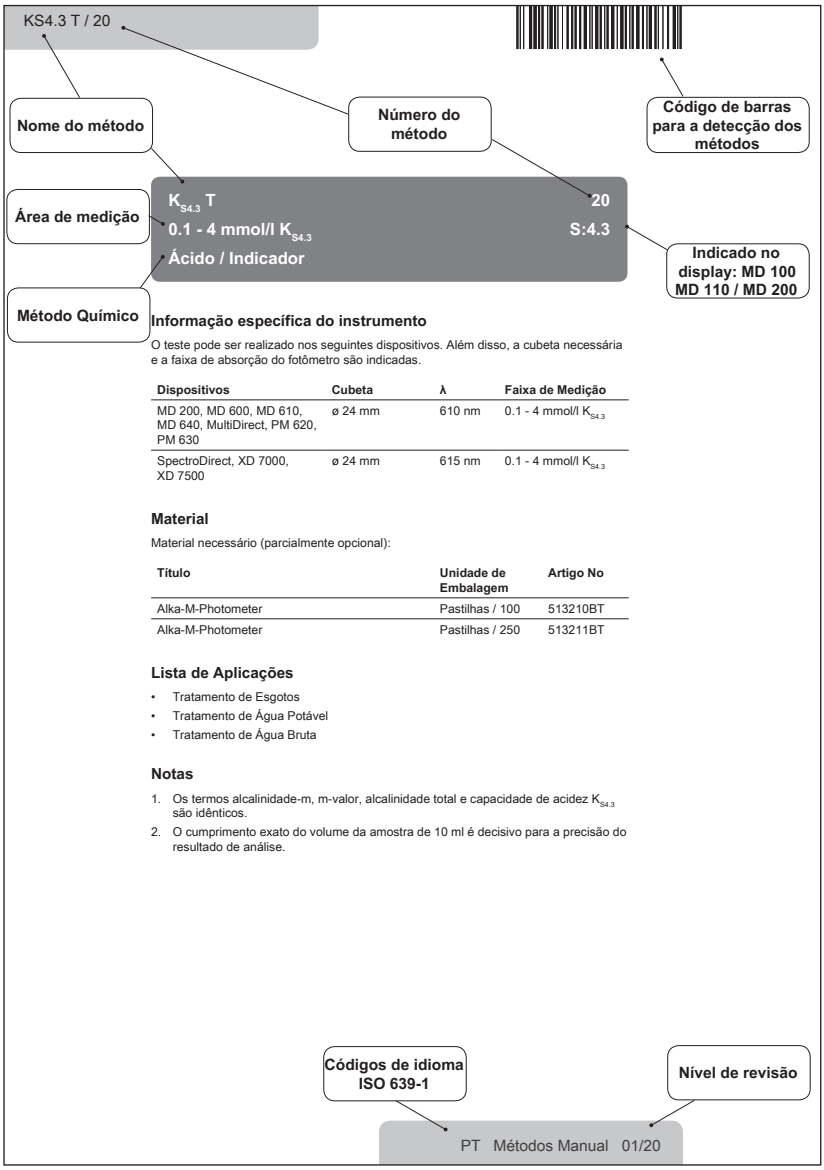
Interferenze escludibili

1. Le concentrazioni di biossido di cloro maggiori di 19 mg/L possono dare risultati entro il range di misura fino a 0 mg/L. In questo caso il campione di acqua deve essere diluito con acqua priva di biossido di cloro. 10 ml del campione diluito vengono addizionati con il reagente e la misurazione viene ripetuta.

Derivato di

DIN 38408, parte 5

[e)]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 | [9)]Reagente ausiliario, è inoltre necessario per la determinazione di bromo, biossido di cloro o ozono in presenza di cloro | [j)]#Bacchetta compresa


KS4.3 T / 20
Nome do método
Número do método
Código de barras para a detecção dos métodos
Área de medição
$K_{S4.3}$ T
20
0.1 - 4 mmol/l $K_{S4.3}$
S:4.3
Ácido / Indicador
Indicado no display: MD 100 MD 110 / MD 200
Método Químico
Informação específica do instrumento
O teste pode ser realizado nos seguintes dispositivos. Além disso, a cubeta necessária e a faixa de absorção do fotômetro são indicadas.
Dispositivos | Cubeta | λ | 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 $K_{S4.3}$
SpectroDirect, XD 7000, XD 7500 | ø 24 mm | 615 nm | 0.1 - 4 mmol/l $K_{S4.3}$
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 $K_{S4.3}$ 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

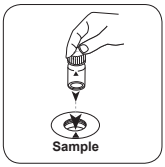
Realização da determinação Capacidade de acidez $K_{S4.3}$ com pastilha

Escolher o método no equipamento.

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

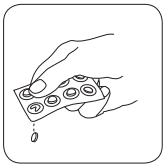
Encher a célula de 24 mm com **10 ml de amostra** .

Fechar a(s) célula(s).

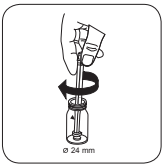


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

• • •



Pastilha ALKA-M-PHOTOMETER.



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

Fechar a(s) célula(s).

PT Métodos Manual 01/20

Cloro T M100

0.01 - 6.0 mg/L Cl_2 [a] CL6

DPD

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
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 [e]	Pastilhas / 100	515740BT
DPD Nº. 1 Alto Cálcio [e]	Pastilhas / 250	515741BT
DPD Nº. 1 Alto Cálcio [e]	Pastilhas / 500	515742BT
DPD Nº. 3 Alto Cálcio [e]	Pastilhas / 100	515730BT
DPD Nº. 3 Alto Cálcio [e]	Pastilhas / 250	515731BT
DPD Nº. 3 Alto Cálcio [e]	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

Padrões disponíveis

Título	Unidade de Embalagem	Código do Produto
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).

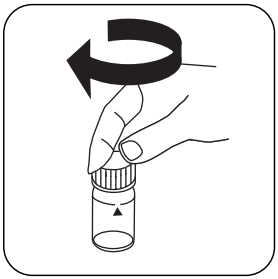
Notas

1. Os pastilhas Evo podem ser utilizadas como alternativa à pastilha padrão correspondente (por exemplo, DPD Nº 3 Evo em vez da DPD Nº 3).

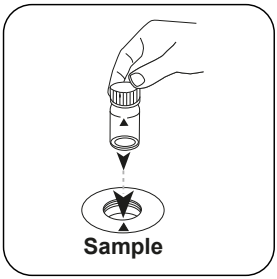
Realização da determinação Cloro livre com pastilha

Escolher o método no equipamento.

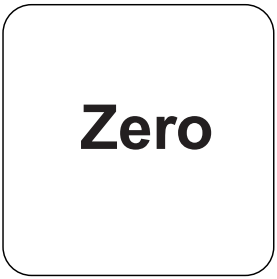
Encher a célula de 24 mm com **10 mL de amostra** .



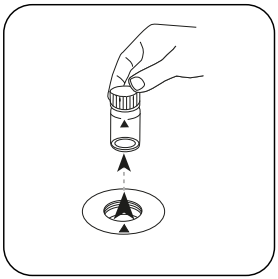
Fechar a(s) célula(s).



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

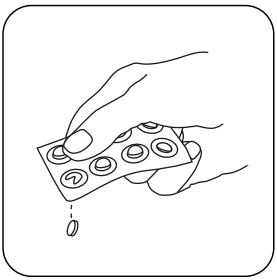


Premir a tecla **ZERO**.

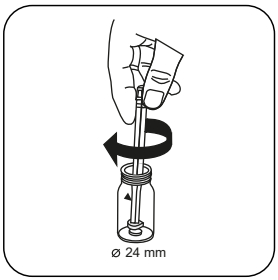


Retirar a célula do compartimento de medição.

Esvaziar a célula até ficarem apenas algumas gotas.

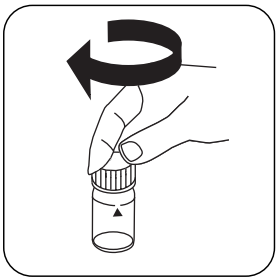


Pastilha DPD No. 1.

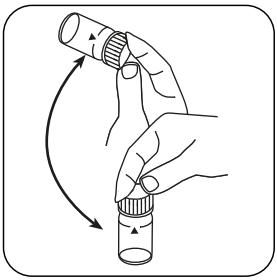


Esmagar a(s) pastilha(s) rodando ligeiramente.

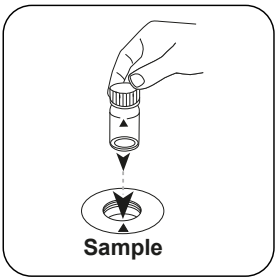
Encher a célula até à **marca de 10 mL** com a **amostra** .



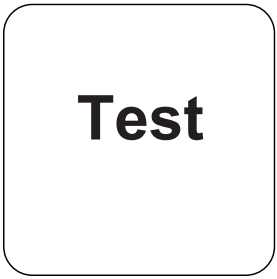
Fechar a(s) célula(s).



Dissolver a(s) pastilha(s) girando.



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



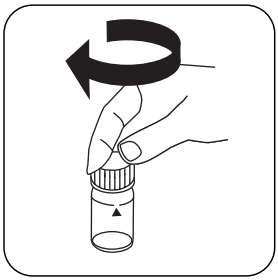
Premir a tecla **TEST** (XD: **START**).

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

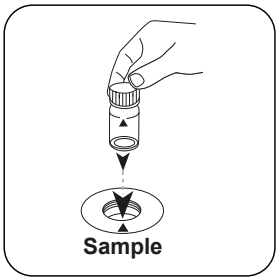
Realização da determinação Cloro total com pastilha

Escolher o método no equipamento.

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

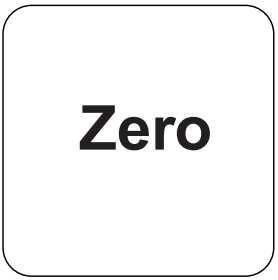


Fechar a(s) célula(s).

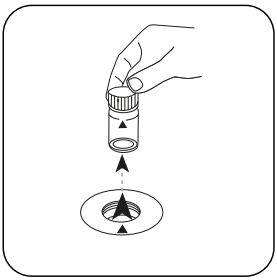


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

PT

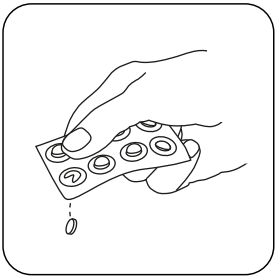


Premir a tecla **ZERO**.

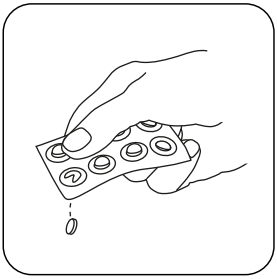


Retirar a célula do compartimento de medição.

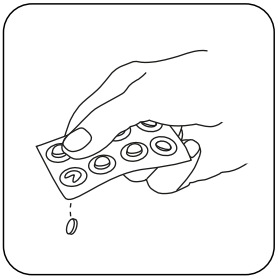
Esvaziar a célula até ficarem apenas algumas gotas.



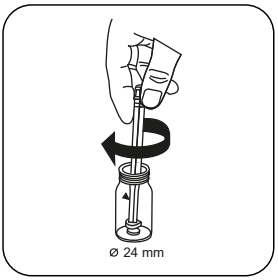
Pastilha DPD No. 1.



Pastilha DPD No. 3.

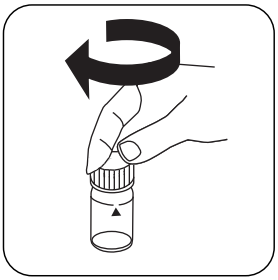


Como alternativa aos comprimidos DPD No. 1 e No. 3, pode ser adicionado 1 comprimido DPD No. 4.

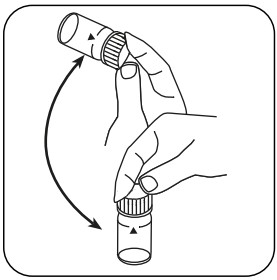


Esmagar a(s) pastilha(s) rodando ligeiramente.

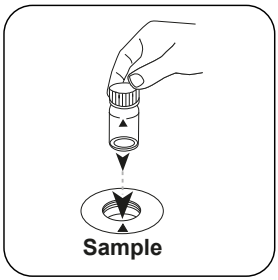
Encher a célula até à **marca de 10 mL** com a **amostra** .



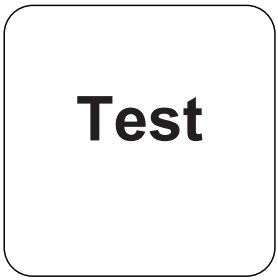
Fechar a(s) célula(s).



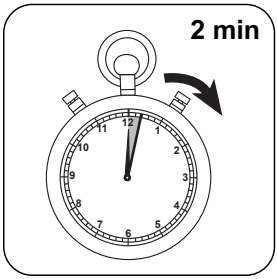
Dissolver a(s) pastilha(s) girando.



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 Pesistentes

- 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).

Interferências	a partir de / [mg/L]
CrO_4^{2-}	0.01
MnO_2	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
Coeficiente de Variação	0.87 %

Conformidade

EN ISO 7393-2

[a]Determinação do possível livre, vinculado, total | [e]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_2 [a] CL6

DPD

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
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

Título	Unidade de Embalagem	Código do Produto
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).

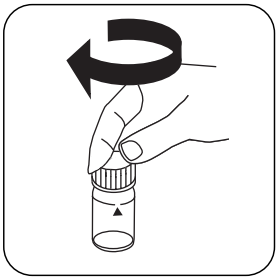
Notas

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.

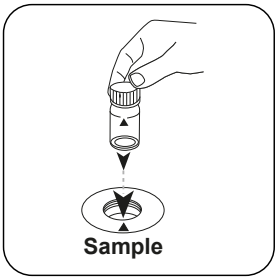
Realização da determinação Cloro livre com reagente líquido

Escolher o método no equipamento.

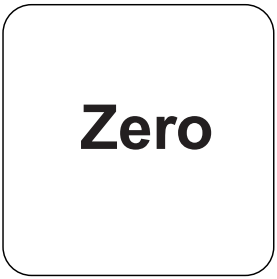
Encher a célula de 24 mm com **10 mL de amostra** .



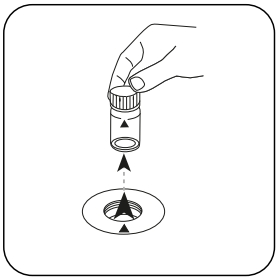
Fechar a(s) célula(s).



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

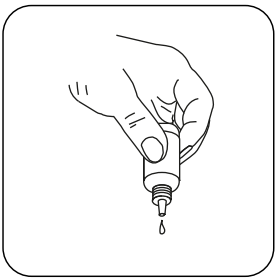


Premir a tecla **ZERO**.

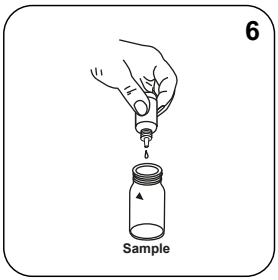


Retirar a célula do compartimento de medição.

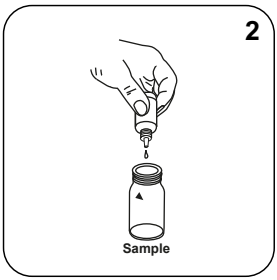
Esvaziar a célula.



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

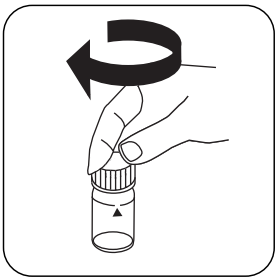


Adicionar **6 gotas DPD 1 Buffer Solution** à célula de amostra.

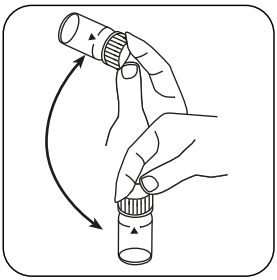


Adicionar **2 gotas DPD 1 Reagent Solution** à célula de amostra.

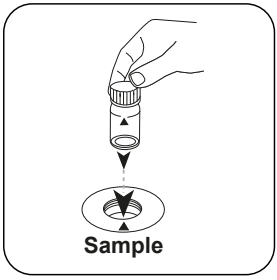
Encher a célula até à **marca de 10 mL** com a **amostra** .



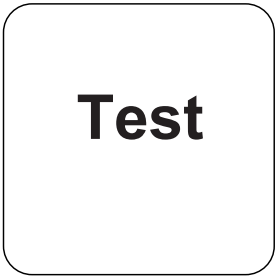
Fechar a(s) célula(s).



Misturar o conteúdo girando.



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



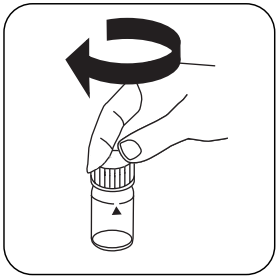
Premir a tecla **TEST** (XD: **START**).

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

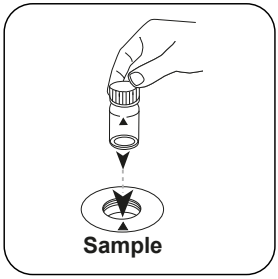
Realização da determinação Cloro total com reagente líquido

Escolher o método no equipamento.

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

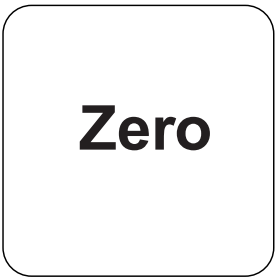


Fechar a(s) célula(s).

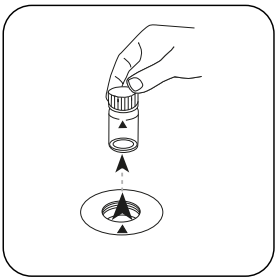


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

PT

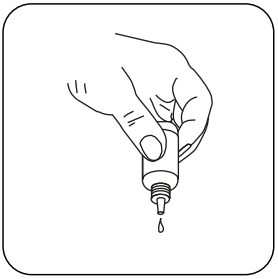


Premir a tecla **ZERO**.

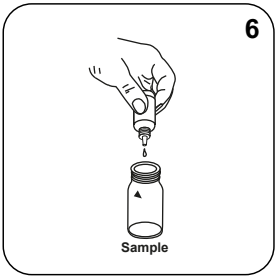


Retirar a célula do compartimento de medição.

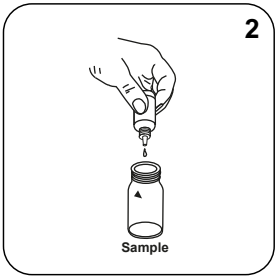
Esvaziar a célula.



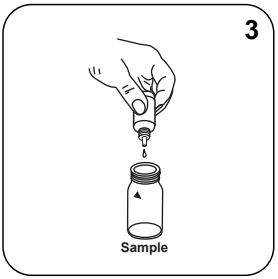
Manter os frascos conta gotas na vertical e pressionar lentamente para adicionar gotas de igual dimensão.



Adicionar **6 gotas DPD 1 Buffer Solution** à célula de amostra.

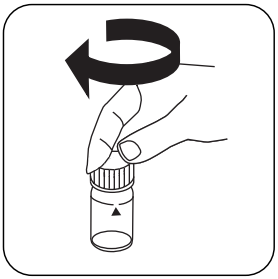


Adicionar **2 gotas DPD 1 Reagent Solution** à célula de amostra.



Adicionar **3 gotas DPD 3 Solution** à célula de amostra.

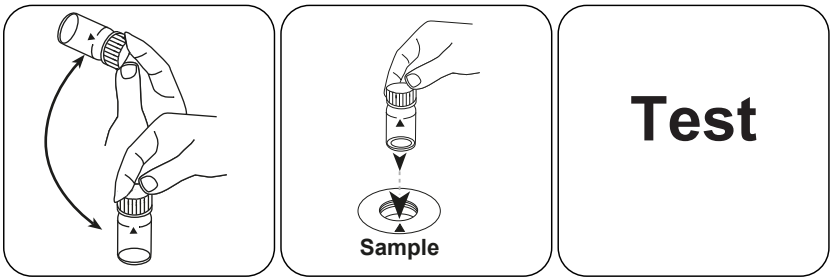
Encher a célula até à **marca de 10 mL** com a **amostra** .



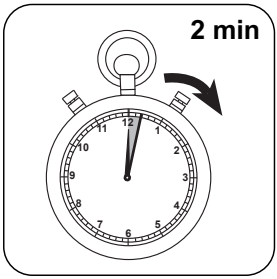
Fechar a(s) célula(s).

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 Pesistentes

- 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).

Interferências	a partir de / [mg/L]
CrO_4^{2-}	0,01
MnO_2	0,01

Conformidade

EN ISO 7393-2

[a)]Determinação do possível livre, vinculado, total

Cloro HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

KI / Ácido

PT

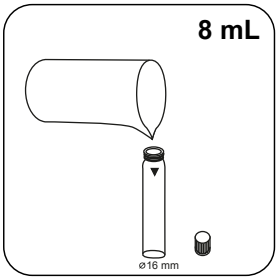
Material

Material necessário (parcialmente opcional):

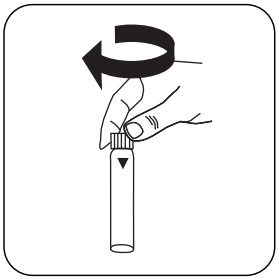
Reagentes	Unidade de Embalagem	Código do Produto
Cloro HR (KI)	Pastilhas / 100	513000BT
Cloro HR (KI)	Pastilhas / 250	513001BT
Acidificante GP	Pastilhas / 100	515480BT
Acidificante GP	Pastilhas / 250	515481BT
Definir Cloro HR (KI)/Acidificar GP#	cada 100	517721BT
Definir Cloro HR (KI)/Acidificar GP#	cada 250	517722BT
Cloro HR (KI)	Pastilhas / 100	501210
Cloro HR (KI)	Pastilhas / 250	501211

Realização da determinação Cloro HR (KI) com pastilha

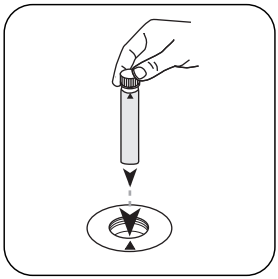
Escolher o método no equipamento.



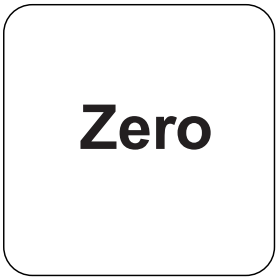
Encher a célula de 16 mm com **8 mL de amostra** .



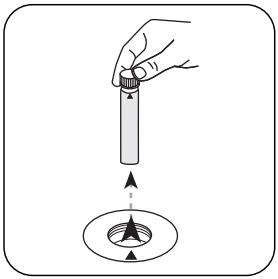
Fechar a(s) célula(s).



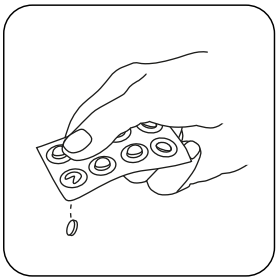
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



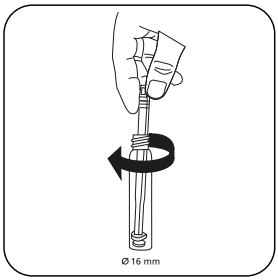
Premir a tecla **ZERO**.



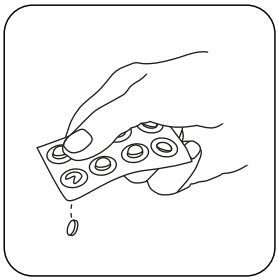
Retirar a **célula** do compartimento de medição.



Pastilha Chlorine HR (KI).

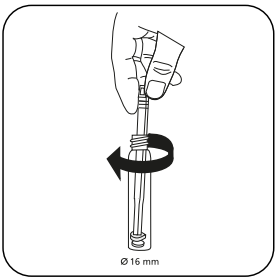


Esmagar a(s) pastilha(s) rodando ligeiramente.

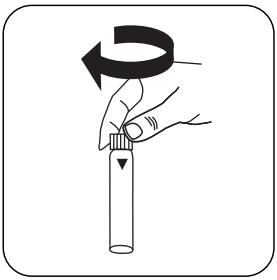


Pastilha ACIDIFYING GP.

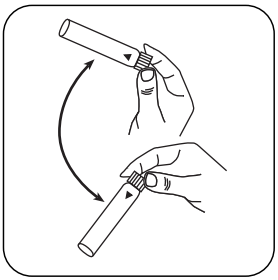
PT



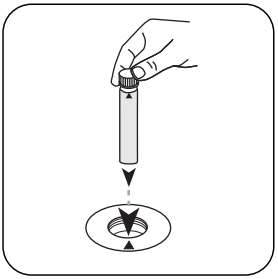
Esmagar a(s) pastilha(s) rodando ligeiramente.



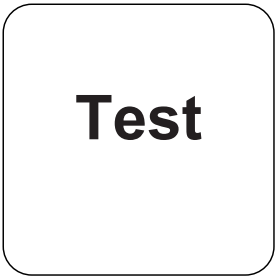
Fechar a(s) célula(s).



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 em mg/L Cloro.

Método Químico

KI / Ácido

Apêndice

Texto de Interferências

Interferências Pesistentes

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

Validação de método

Limite de Detecção	1.29 mg/L
Limite de Determinação	3.86 mg/L
Fim da Faixa de Medição	200 mg/L
Sensibilidade	83.96 mg/L / Abs
Faixa de Confiança	1.14 mg/L
Desvio Padrão	0.45 mg/L
Coeficiente de Variação	0.45 %

Derivado de

EN ISO 7393-3

#incluindo vareta de agitação

Dióxido de cloro T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / Glicina

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
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
Glicina [f)]	Pastilhas / 100	512170BT
Glicina [f)]	Pastilhas / 250	512171BT
DPD Nº. 3 Alto Cálcio [e)]	Pastilhas / 100	515730BT
DPD Nº. 3 Alto Cálcio [e)]	Pastilhas / 250	515731BT
DPD Nº. 3 Alto Cálcio [e)]	Pastilhas / 500	515732BT
DPD Nº. 1 Alto Cálcio [e)]	Pastilhas / 100	515740BT
DPD Nº. 1 Alto Cálcio [e)]	Pastilhas / 250	515741BT
DPD Nº. 1 Alto Cálcio [e)]	Pastilhas / 500	515742BT
Definir N.º DPD 1/Não. 3[#]	cada 100	517711BT
Definir N.º DPD 1/Não. 3[#]	cada 250	517712BT
Definir N.º DPD 1/Glicina [#]	cada 100	517731BT
Definir N.º DPD 1/Glicina [#]	cada 250	517732BT
Definir N.º DPD 1/Não. 3 Alto Cálcio[#]	cada 100	517781BT
Definir N.º DPD 1/Não. 3 Alto Cálcio[#]	cada 250	517782BT
DPD Nº. 3 Evo	Pastilhas / 100	511420BT
DPD Nº. 3 Evo	Pastilhas / 250	511421BT
DPD Nº. 3 Evo	Pastilhas / 500	511422BT

Amostragem

1. Na preparação da amostra é preciso evitar a libertação de gases, 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 Dióxido 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. As águas fortemente alcalinas ou ácidas devem, 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 Nº 3 EVO em vez da DPD Nº 3).

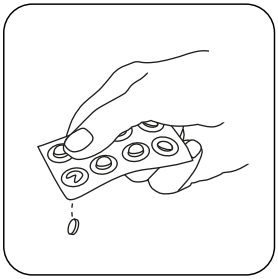
PT

Realização da determinação Dióxido de Cloro, na presença de cloro com pastilha

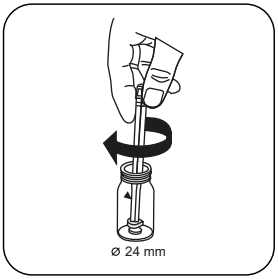
Escolher o método no equipamento.

Escolha ainda a determinação: na presença de Cloro

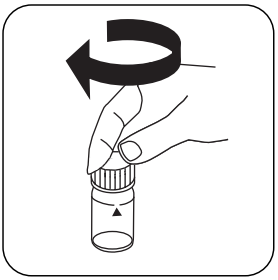
Encher a célula de 24 mm com **10 mL de amostra** .



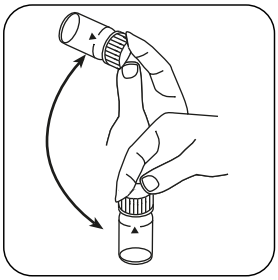
Pastilha GLYCINE.



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

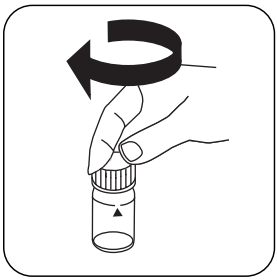


Fechar a(s) célula(s).

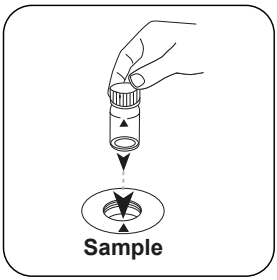


Dissolver a(s) pastilha(s) girando.

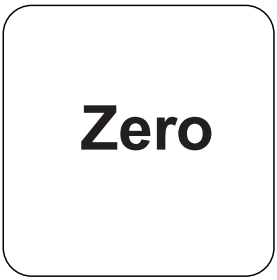
Encher uma **segunda célula** com **10 mL de amostra** .



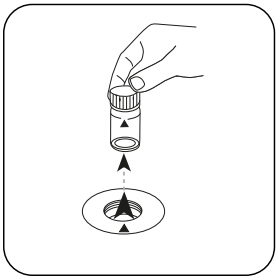
Fechar a(s) célula(s).



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

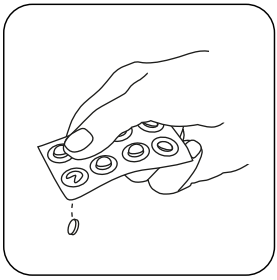


Premir a tecla **ZERO**.

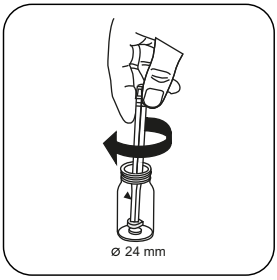


Retirar a célula do compartimento de medição.

Esvaziar a célula.

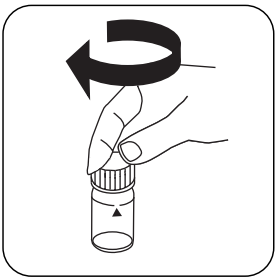


Pastilha DPD No. 1.

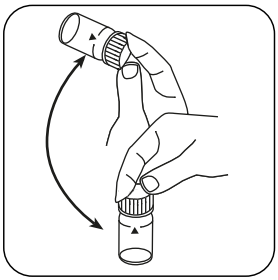


Esmagar a(s) pastilha(s) rodando ligeiramente.

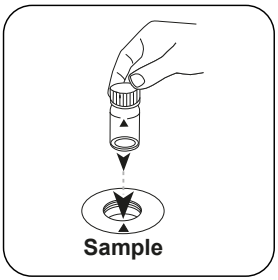
Introduzir a **solução de glicina** preparada na célula preparada.



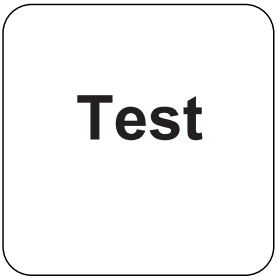
Fechar a(s) célula(s).



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 em mg/L Dióxido de Cloro.

Análises

A tabela a seguir identifica os valores de saída que podem ser convertidos em outras formas de citação.

Unidade	Forma de citação	Fator de conversão
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Método Químico

DPD / Glicina

Apêndice

Texto de Interferências

Interferências Pesistentes

1. Todos os oxidantes presentes nas amostras levam a resultados demasiado altos.

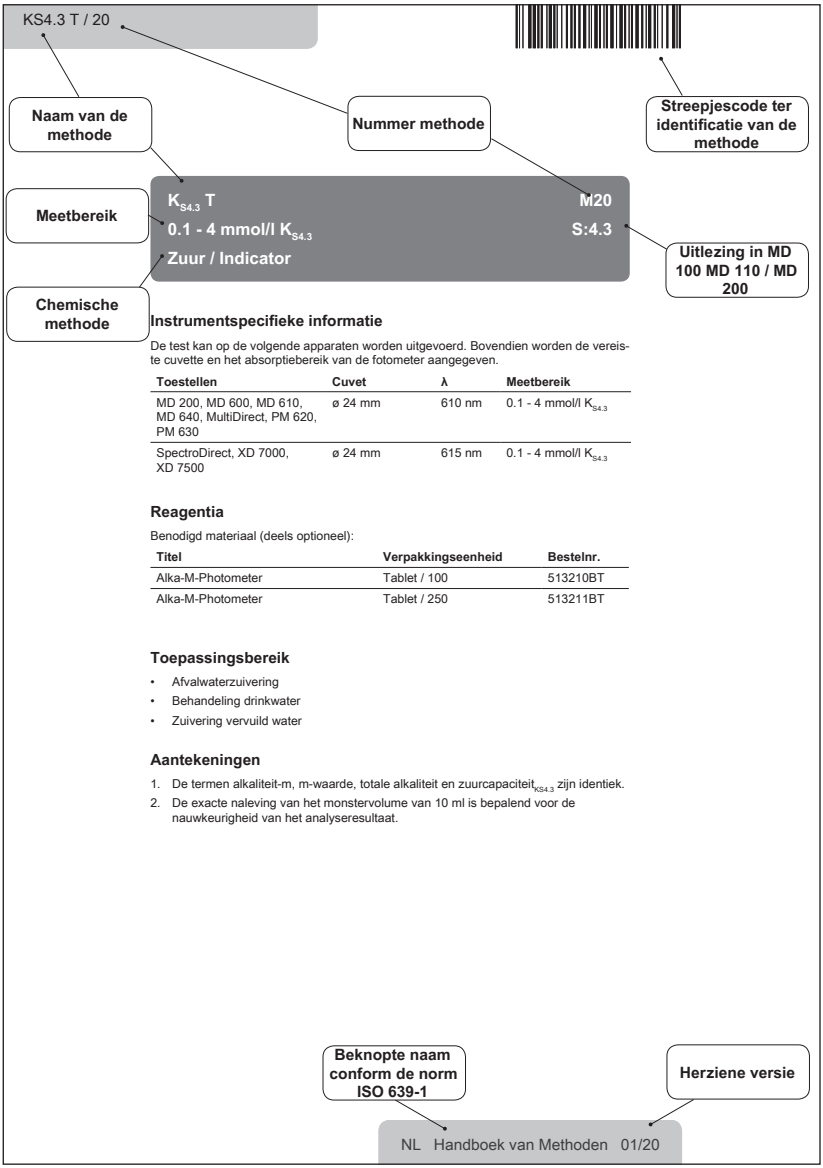
Interferências Removíveis

1. Concentrações de dióxido de cloro superiores a 19 mg/L podem causar resultados dentro da área de medição até 0 mg/L. Neste caso, deve diluir a amostra de água em água sem dióxido de cloro. 10 ml da amostra diluída é colocada em reagente e a medição é repetida.

Derivado de

DIN 38408, Parte 5

[e]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 | [9]Reagente auxiliar, é adicionalmente necessário para a determinação de bromo, dióxido de cloro ou ozônio na presença de cloro | [#]incluindo vareta de agitação



Instrumentspecifieke informatie

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

Toestellen	Cuvet	λ	Meetbereik
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 $K_{S4.3}$

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$_{KS4.3}$ zijn identiek.
2. De exacte naleving van het monstervolume van 10 ml is bepalend voor de nauwkeurigheid van het analyseresultaat.

Uitvoering van de meting

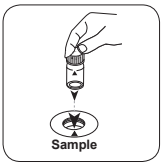
Uitvoering van de bepaling Zuurcapaciteit $K_{S4.3}$ met tablet

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.

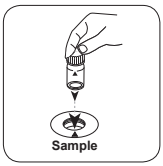
De spoelbakjes afsluiten.



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

• • •

Tabletten oplossen door om te draaien



Het **staalspoelbakje** 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_2 [a] CL6

DPD

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
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 [e]	Tablet / 100	515740BT
DPD Nr. 1 hoog calcium [e]	Tablet / 250	515741BT
DPD Nr. 1 hoog calcium [e]	Tablet / 500	515742BT
DPD Nr. 3 hoog calcium [e]	Tablet / 100	515730BT
DPD Nr. 3 hoog calcium [e]	Tablet / 250	515731BT
DPD Nr. 3 hoog calcium [e]	Tablet / 500	515732BT
DPD Nr. 4	Tablet / 100	511220BT
DPD Nr. 4	Tablet / 250	511221BT
DPD Nr. 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 Nr.4 Evo	Tablet / 100	511970BT
DPD Nr. 4 Evo	Tablet / 250	511971BT
DPD Nr. 4 Evo	Tablet / 500	511972BT

Beschikbare standaarden

Omschrijving	Verpakkingseenheid	Bestelnr.
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 geplaatst.

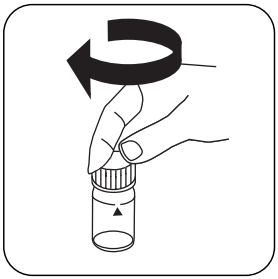
Aantekeningen

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

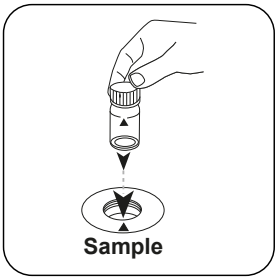
Uitvoering van de bepaling vrij chloor met tablet

De methode in het apparaat selecteren.

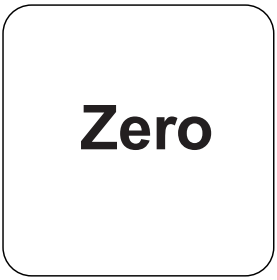
Spoelbakje van 24 mm met **10 mL staal** vullen.



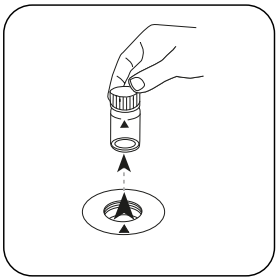
De spoelbakjes afsluiten.



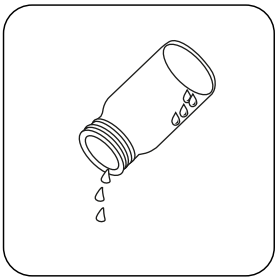
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



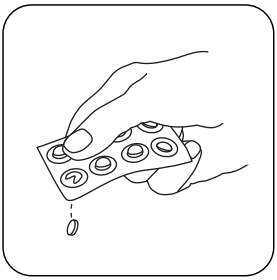
De toets **NUL** indrukken.



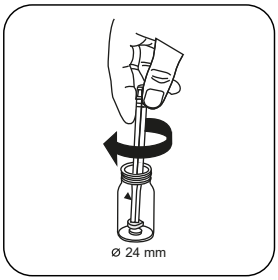
Het spoelbakje uit de meetschacht nemen.



Het spoelbakje tot op enkele druppels ledigen.

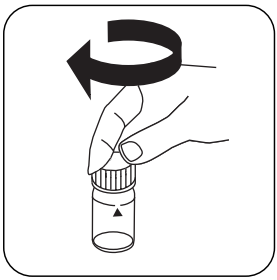


Een DPD Nr. 1 tablet toevoegen.

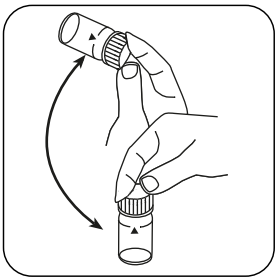


De tabletten onder lichte rotatie verpletteren.

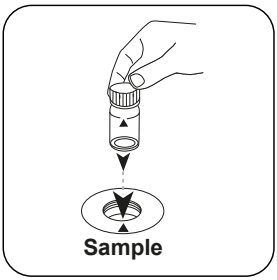
Het spoelbakje tot aan de **markering van 10 mL** met het **staal** vullen.



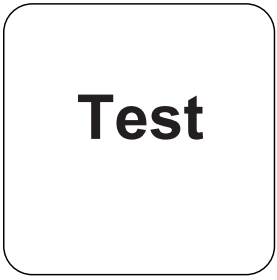
De spoelbakjes afsluiten.



Tabletten oplossen door om te draaien



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



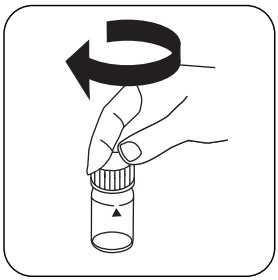
De toets **TEST** (XD: **START**) indrukken.

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

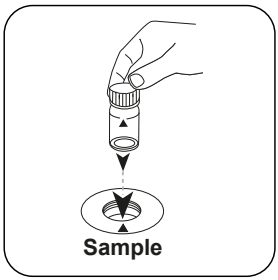
Uitvoering van de bepaling totaal chloor met tablet

De methode in het apparaat selecteren.

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

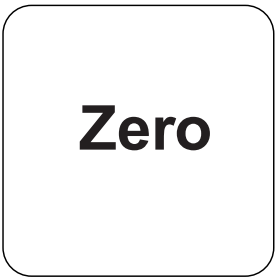


De spoelbakjes afsluiten.

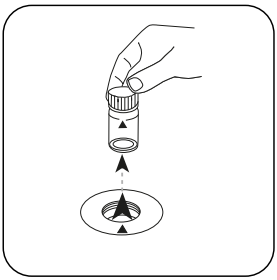


Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.

NL

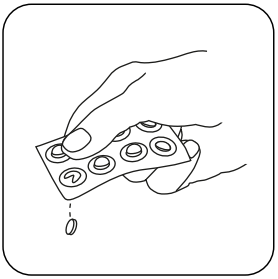


De toets **NUL** indrukken.

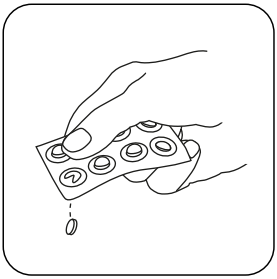


Het spoelbakje uit de meetschacht nemen.

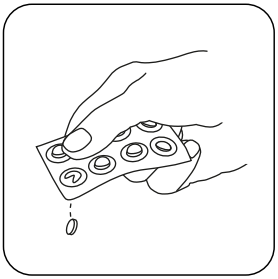
Het spoelbakje tot op enkele druppels ledigen.



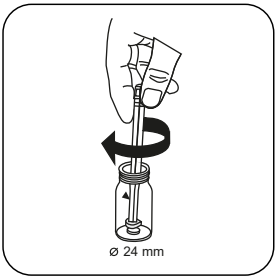
Een DPD Nr. 1 tablet toevoegen.



Een DPD Nr. 3 tablet toevoegen.

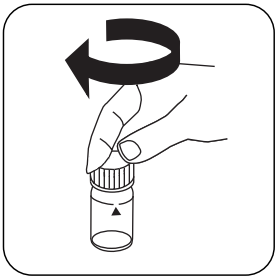


Als alternatief voor DPD nr. 1 en nr. 3 tabletten kan 1 DPD nr. 4 tablet worden toegevoegd.

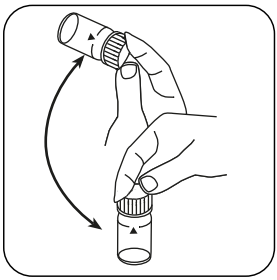


De tabletten onder lichte rotatie verpletteren.

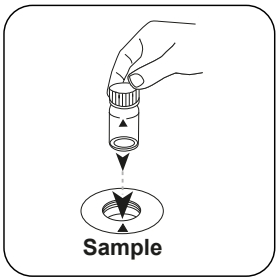
Het spoelbakje tot aan de **markering van 10 mL** met het **staal** vullen.



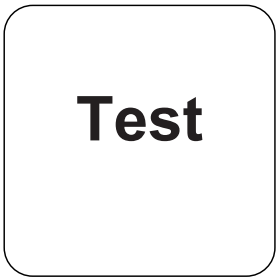
De spoelbakjes afsluiten.



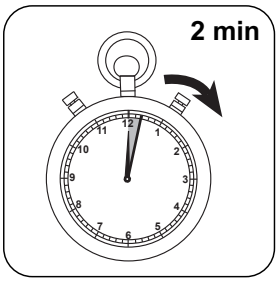
Tabletten oplossen door om te draaien



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



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



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.
- 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).

Verstoringen	verstoort vanaf
CrO_4^{2-}	0.01
MnO_2	0.01

Validatie van de methodes

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

Conform

EN ISO 7393-2

[a)] bepaling van de vrije, gebonden, totaal mogelijke | [e)] 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_2 [a] CL6

DPD

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	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

Omschrijving	Verpakkingseenheid	Bestelnr.
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 geplaatst.

Aantekeningen

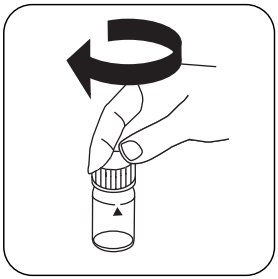
1. Na gebruik moeten de druppelflacons onmiddellijk worden gesloten met de schroefdop van dezelfde kleur.
2. Bewaar het reagens ingesteld op +6 °C tot +10 °C op een koele plaats.

NL

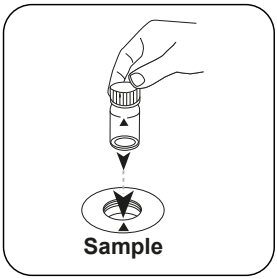
Uitvoering van de bepaling vrij chloor met vloeibaar reagens

De methode in het apparaat selecteren.

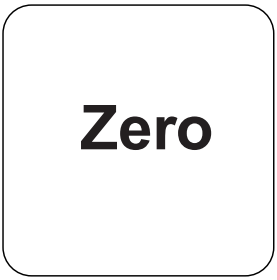
Spoelbakje van 24 mm met **10 mL staal** vullen.



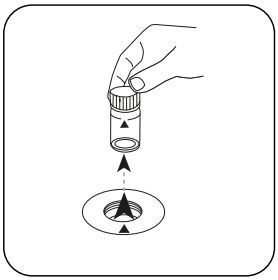
De spoelbakjes afsluiten.



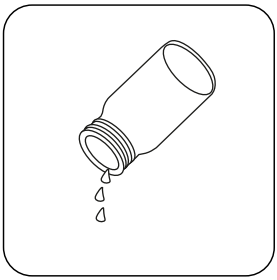
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



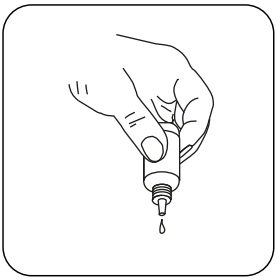
De toets **NUL** indrukken.



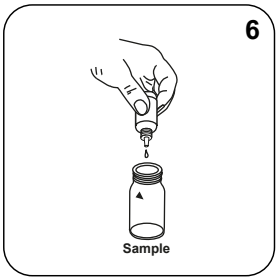
Het spoelbakje uit de meetschacht nemen.



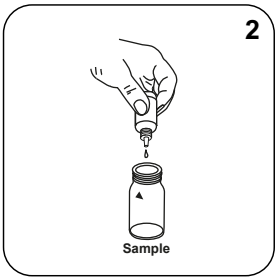
Het spoelbakje ledigen.



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

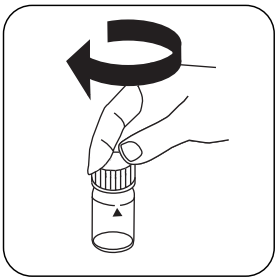


6 druppels DPD
1 bufferoplossing in het staalspoelbakje doen.

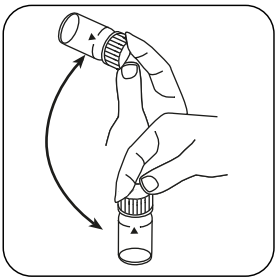


2 druppels DPD
1 reagensoplossing in het staalspoelbakje doen.

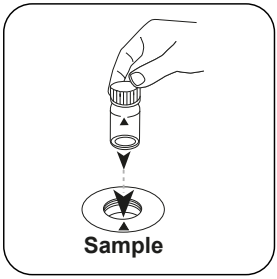
Het spoelbakje tot aan de **markering van 10 mL** met het **staal** vullen.



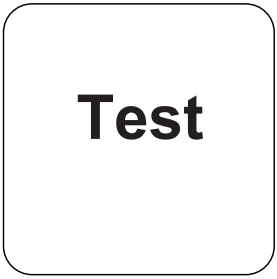
De spoelbakjes afsluiten.



De inhoud mengen door om te draaien.



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



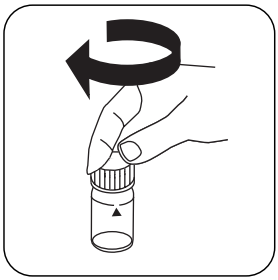
De toets **TEST** (XD: **START**) indrukken.

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

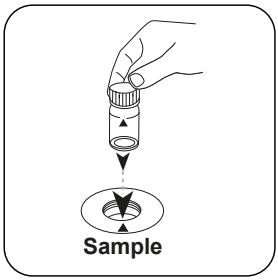
Uitvoering van de bepaling totaal chloor met vloeibaar reagens

De methode in het apparaat selecteren.

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

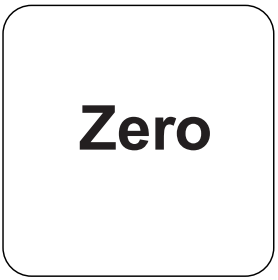


De spoelbakjes afsluiten.

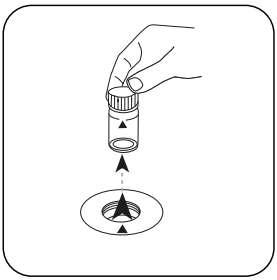


Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.

NL

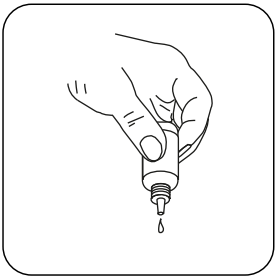


De toets **NUL** indrukken.

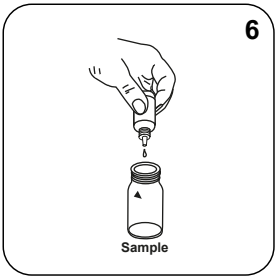


Het spoelbakje uit de meetschacht nemen.

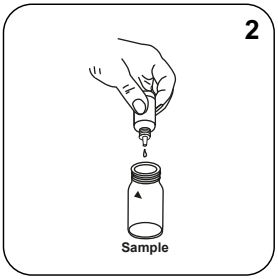
Het spoelbakje ledigen.



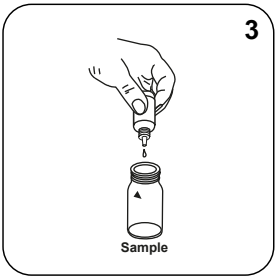
De druppelflessen verticaal houden en even grote druppels toevoegen door langzaam te drukken.



6 druppels DPD
1 bufferoplossing in het staalspoelbakje doen.

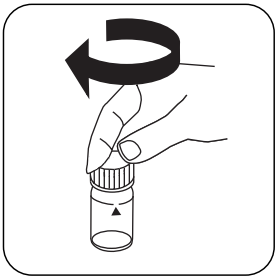


2 druppels DPD
1 reagensoplossing in het staalspoelbakje doen.

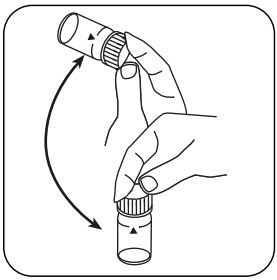


3 druppels DPD
3 oplossing in het staalspoelbakje doen.

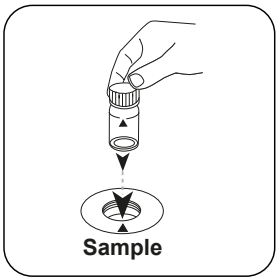
Het spoelbakje tot aan de **markering van 10 mL** met het **staal** vullen.



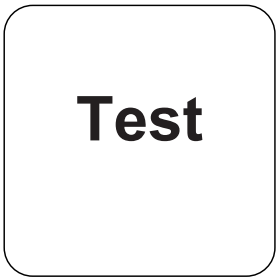
De spoelbakjes afsluiten.



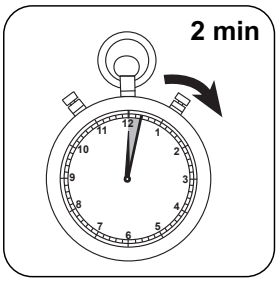
De inhoud mengen door om te draaien.



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



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



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).

Verstoringen	verstoort vanaf
CrO_4^{2-}	0,01
MnO_2	0,01

Conform

EN ISO 7393-2

[a] bepaling van de vrije, gebonden, totaal mogelijke

Chloor HR (KI) T M105

5 - 200 mg/L Cl_2 CLHr

Al / Zuur

NL

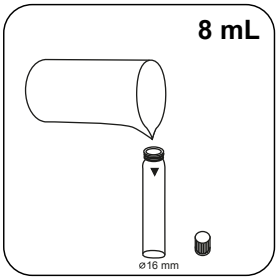
Reagentia

Benodigd materiaal (deels optioneel):

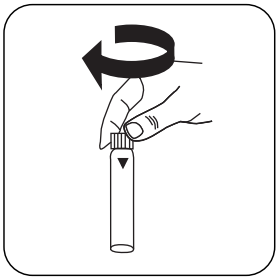
Reagentia	Verpakkingseenheid	Bestelnr.
Chloor HR (KI)	Tablet / 100	513000BT
Chloor HR (KI)	Tablet / 250	513001BT
Acidifying GP	Tablet / 100	515480BT
Acidifying GP	Tablet / 250	515481BT
Set chloor HR (KI)/Acidifying GP#	per 100	517721BT
Set chloor HR (KI)/Acidifying GP#	per 250	517722BT
Chloor HR (KI)	Tablet / 100	501210
Chloor HR (KI)	Tablet / 250	501211

Uitvoering van de bepaling Chloor HR (KI) met tablet

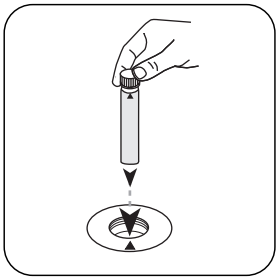
De methode in het apparaat selecteren.



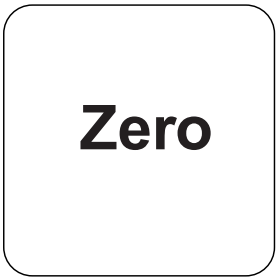
Spoelbakje van 16 mm met **8 mL staal** vullen.



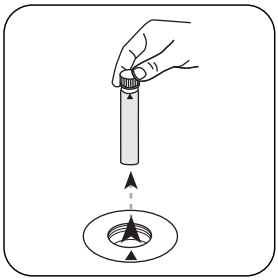
De spoelbakjes afsluiten.



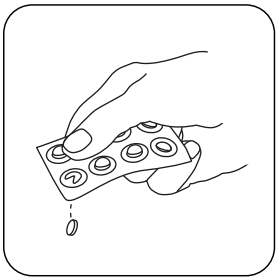
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



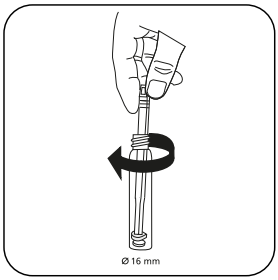
De toets **NUL** indrukken.



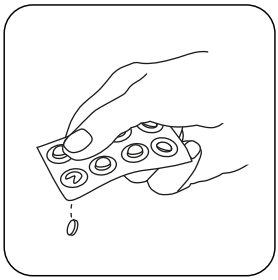
Het **spoelbakje** uit de meetschacht nemen.



Een Chloor HR (KI) tablet toevoegen.

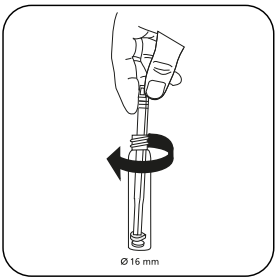


De tabletten onder lichte rotatie verpletteren.

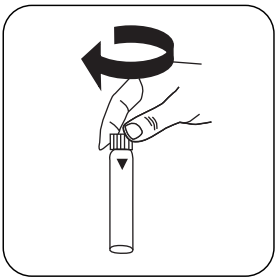


Een ACIDIFYING GP tablet toevoegen.

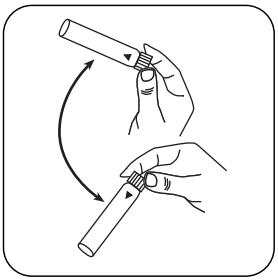
NL



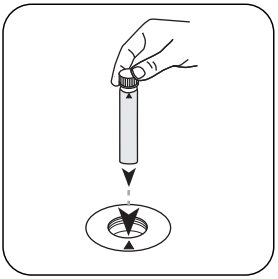
De tabletten onder lichte rotatie verpletteren.



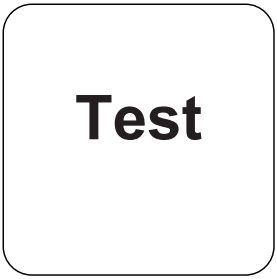
De spoelbakjes afsluiten.



Tabletten oplossen door om te draaien



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



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

De display toont het resultaat in mg/L Chloor.

Chemische methode

AI / Zuur

Aanhangsel

Verstoringen

Permanente verstoringen

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

Validatie van de methodes

Aantoonbaarheidsgrens	1.29 mg/L
Bepaalbaarheidsgrens	3.86 mg/L
Einde meetbereik	200 mg/L
Gevoeligheid	83.96 mg/L / Abs
Betrouwbaarheidsgrenzen	1.14 mg/L
Standaardafwijking procedure	0.45 mg/L
Variatiecoefficient procedure	0.45 %

Afgeleid van

EN ISO 7393-3

[#] met inbegrip van de mengstaaf

Chloordioxide T M120

0.02 - 11 mg/L ClO_2 CLO2

DPD/Glycine

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
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
Glycine [f)]	Tablet / 100	512170BT
Glycine [f)]	Tablet / 250	512171BT
DPD Nr. 3 hoog calcium [e)]	Tablet / 100	515730BT
DPD Nr. 3 hoog calcium [e)]	Tablet / 250	515731BT
DPD Nr. 3 hoog calcium [e)]	Tablet / 500	515732BT
DPD Nr. 1 hoog calcium [e)]	Tablet / 100	515740BT
DPD Nr. 1 hoog calcium [e)]	Tablet / 250	515741BT
DPD Nr. 1 hoog calcium [e)]	Tablet / 500	515742BT
Set DPD nr. 1/Nr. 3[#]	per 100	517711BT
Set DPD nr. 1/Nr. 3[#]	per 250	517712BT
Set DPD nr. 1/glycine [#]	per 100	517731BT
Set DPD nr. 1/glycine [#]	per 250	517732BT
Set DPD nr. 1/Nr. 3 hoog calcium[#]	per 100	517781BT
Set DPD nr. 1/Nr. 3 hoog calcium[#]	per 250	517782BT
DPD No. 3 Evo	Tablet / 100	511420BT
DPD No. 3 Evo	Tablet / 250	511421BT
DPD No. 3 Evo	Tablet / 500	511422BT

Bemonstering

1. Tijdens de monstervoorbereiding moet worden vermeden dat 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 Chloordioxide 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. Sterk alkalisch of zuur water moet vóór de analyse in een pH-gebied tussen 6 en 7 (met 0,5 mol/l zwavelzuur of 1 mol/l-natriumhydroxideoplossing) worden gebracht.

Aantekeningen

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

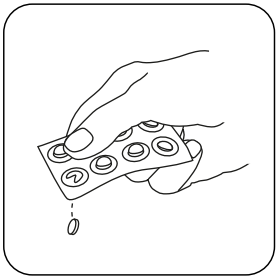
NL

Uitvoering van de bepaling Chloordioxide, naast chloor, met tablet

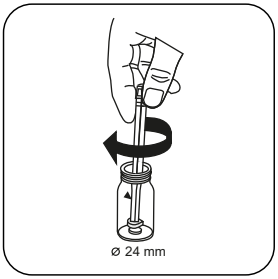
De methode in het apparaat selecteren.

Selecteer bovendien de bepaling: naast chloor

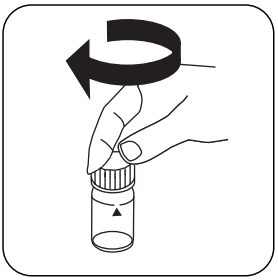
Spoelbakje van 24 mm met **10 mL staal** vullen.



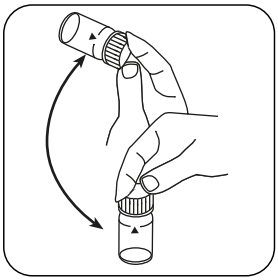
Een GLYCINE tablet toevoegen.



De tabletten onder lichte rotatie verpletteren.

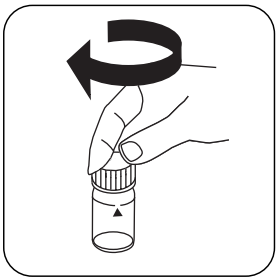


De spoelbakjes afsluiten.

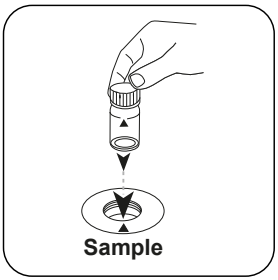


Tabletten oplossen door om te draaien

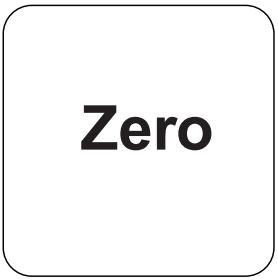
Een **tweede spoelbakje** met **10 mL staal** vullen.



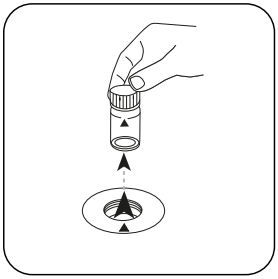
De spoelbakjes afsluiten.



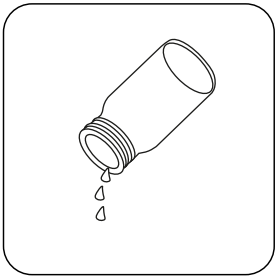
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



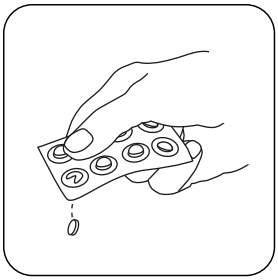
De toets **NUL** indrukken.



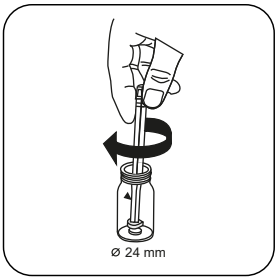
Het spoelbakje uit de meetschacht nemen.



Het spoelbakje ledigen.

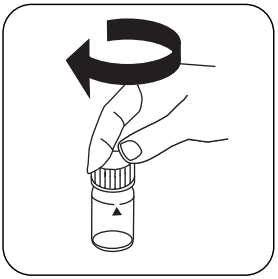


Een DPD Nr. 1 tablet toevoegen.

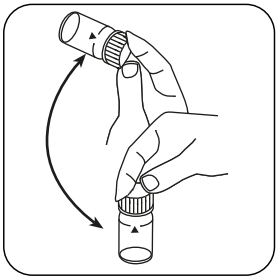


De tabletten onder lichte rotatie verpletteren.

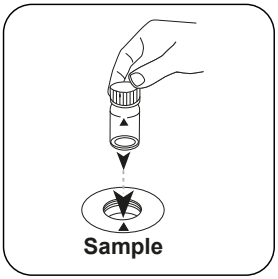
De voorbereide **glycineoplossing** in het voorbereide spoelbakje doen.



De spoelbakjes afsluiten.



Tabletten oplossen door om te draaien



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

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

De display toont het resultaat in mg/L Chloordioxide.

Evaluatie

De volgende tabel geeft aan dat de uitvoerwaarden kunnen worden geconverteerd naar andere citatievormen.

Eenheid	Dagvaardingsformulier	Omrekeningsfactor
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

Chemische methode

DPD/Glycine

Aanhangsel

Verstoringen

Permanente verstoringen

1. Alle oxidatiemiddelen in de monsters leiden tot meerdere resultaten.

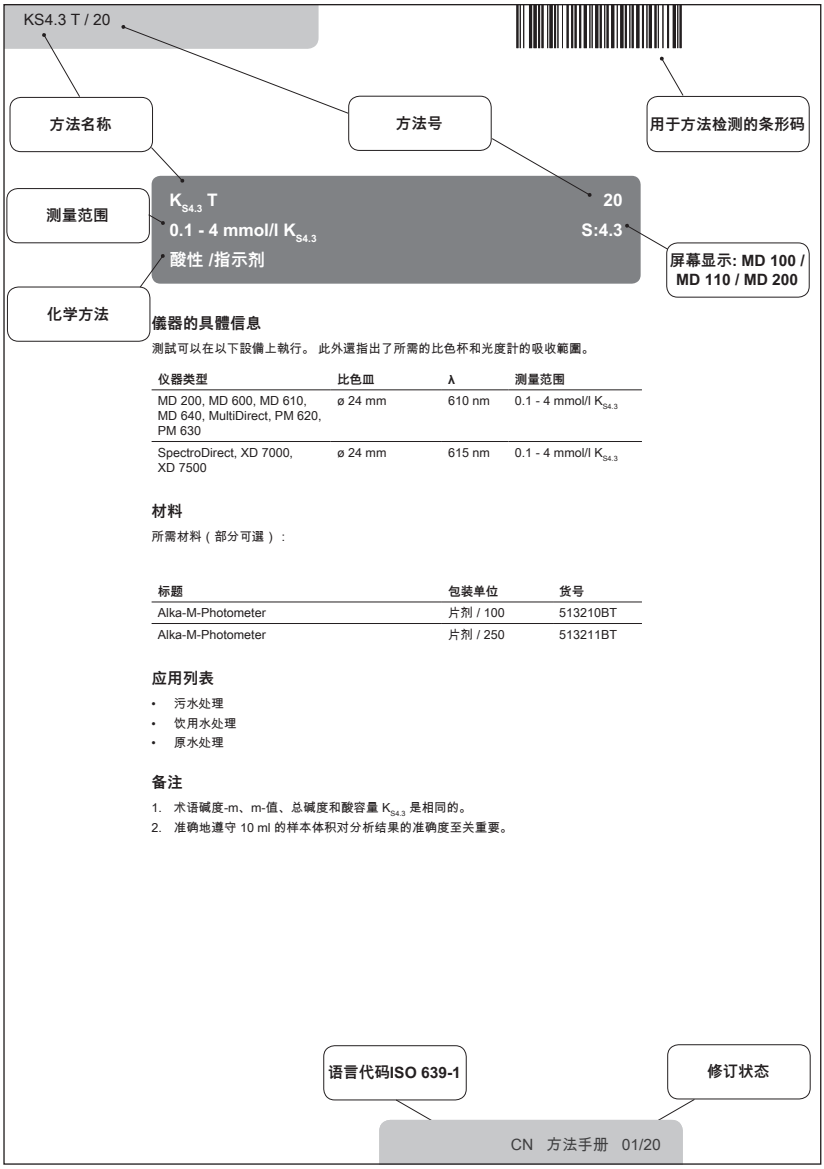
Uit te sluiten verstoringen

1. Concentraties boven de 19 mg/L chloordioxide kan leiden tot resultaten binnen het meetbereik tot 0 mg/L. Verdun in dit geval het watermonster met chloordioxidevrij water. Voeg reagens toe aan 10 ml van het verdunde monster en herhaal de meting.

Afgeleid van

DIN 38408, deel 5

[e)] 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 | [f)] hulpreagens, extra nodig voor de bepaling van broom, chloordioxide of ozon in aanwezigheid van chloor | [#] met inbegrip van de mengstaaf



儀器的具體信息

測試可以在以下設備上執行。 此外還指出了所需的比色杯和光度計的吸收範圍。

仪器类型	比色皿	λ	测量范围
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 $K_{S4.3}$

材料

所需材料（部分可選）：

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。

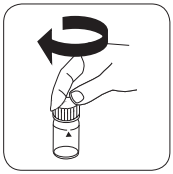
开始测量

进行测定 $K_{S4.3}$ 片剂酸容量

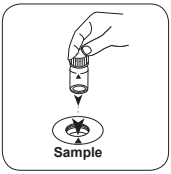
选择设备中的方法。

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 比色杯。

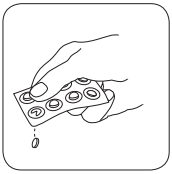


密封比色杯。

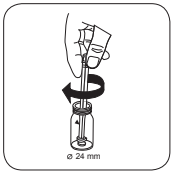


将样本比色杯放入测量轴中。注意定位。

• • •



加入 **ALKA-M-PHOTOMETER** 片剂。



用轻微的扭转压碎片剂。

密封比色杯。

CN 方法手册 01/20

T 氯 M100

0.01 - 6.0 mg/L Cl_2 [a] CL6

DPD

材料
所需材料（部分可選）：

ZH

试剂	包装单位	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 [e]	片剂 / 100	515740BT
DPD No.1 高钙 [e]	片剂 / 250	515741BT
DPD No.1 高钙 [e]	片剂 / 500	515742BT
DPD No.3 高钙 [e]	片剂 / 100	515730BT
DPD No.3 高钙 [e]	片剂 / 250	515731BT
DPD No.3 高钙 [e]	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

現有標準

标题	包装单位	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。

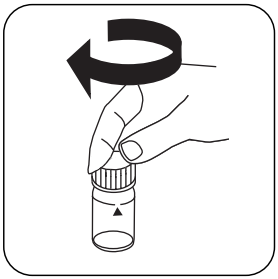
备注

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）。

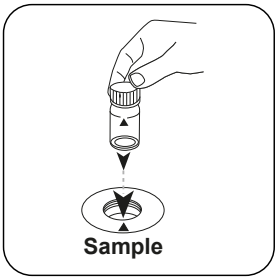
进行测定 余氯 片剂法

选择设备中的方法。

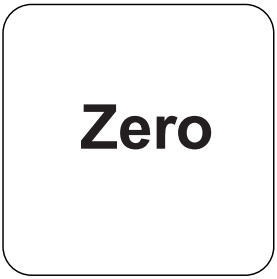
用 **10 mL 样本**填充 24 mm 比色杯。



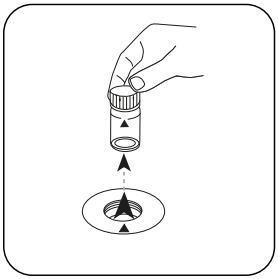
密封比色杯。



将**样本比色杯**放入测量轴中。注意定位。

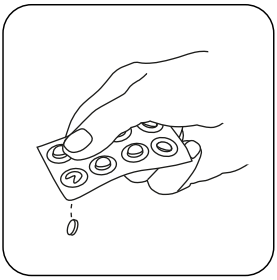


按下 **ZERO** 按钮。

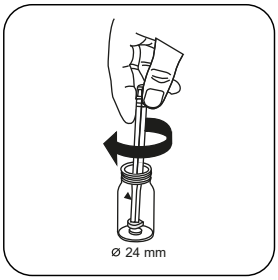


从测量轴上取下比色杯。

将比色杯倒空。

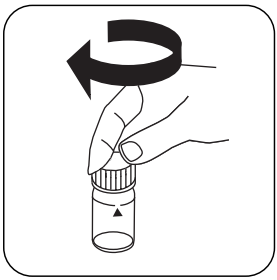


加入 **DPD No. 1 片剂** 。

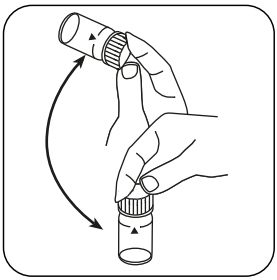


用轻微的扭转压碎片剂。

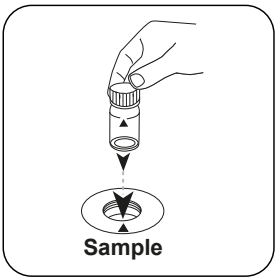
用**样本**将比色杯填充至 **10 mL 刻度**处。



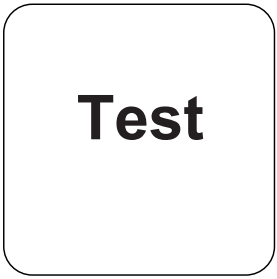
密封比色杯。



通过旋转溶解片剂。



将**样本比色杯**放入测量轴中。注意定位。



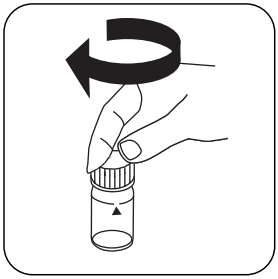
按下 **TEST** (XD: **START**) 按钮。

结果在显示屏上显示为 mg / l 余氯。

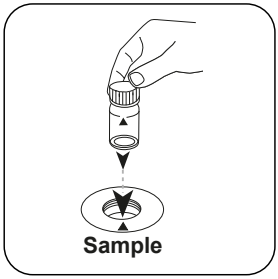
进行测定 总氯 片剂法

选择设备中的方法。

用 **10 mL 样本**填充 24 mm 比色杯。

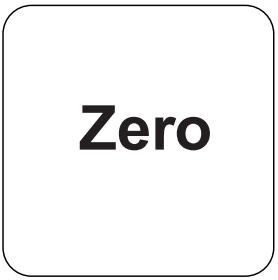


密封比色杯。

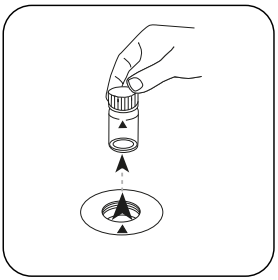


将**样本比色杯**放入测量轴中。注意定位。

ZH

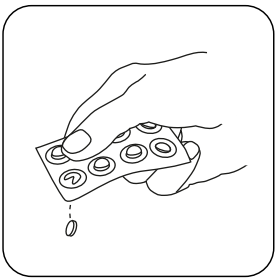


按下 **ZERO** 按钮。

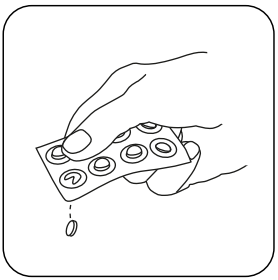


从测量轴上取下比色杯。

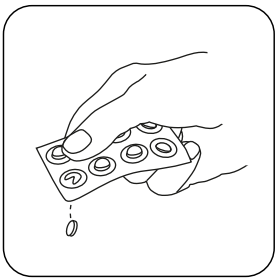
将比色杯倒空。



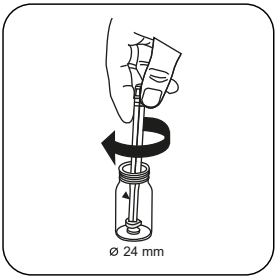
加入 **DPD No. 1 片剂** 。



加入 **DPD No. 3 片剂** 。



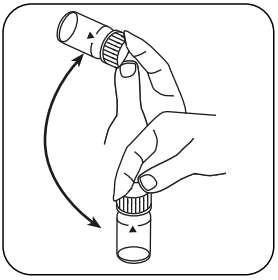
作为DPD 1号和3号片剂的替代品，可以添加1个DPD 4号片剂。



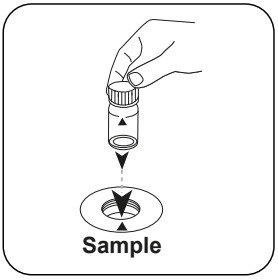
用轻微的扭转压碎片剂。

用**样本**将比色杯填充至 **10 mL 刻度**处。

密封比色杯。

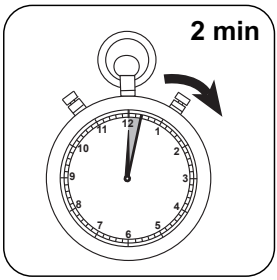


通过旋转溶解片剂。



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。

化学方法

DPD

附錄

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）。

干擾	從/ [mg/l]
CrO_4^{2-}	0.01
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

[a] 测定余氯，总氯和结合氯 | [e] 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浊水样分析

L 氯 M101

0.02 - 4.0 mg/L Cl_2 [a)] CL6

DPD

材料
所需材料（部分可選）：

ZH

试剂	包装单位	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

标题	包装单位	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。

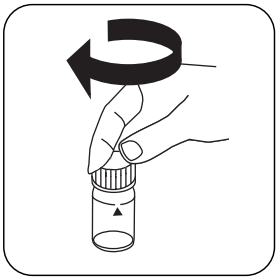
备注

1. 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。

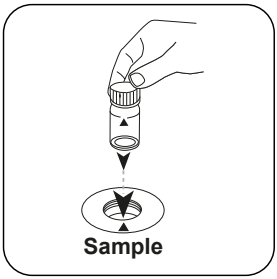
进行测定 余氯 水剂法

选择设备中的方法。

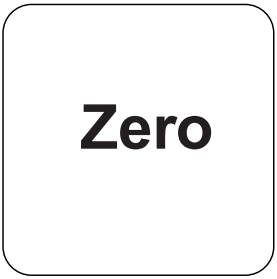
用 **10 mL 样本**填充 24 mm 比色杯。



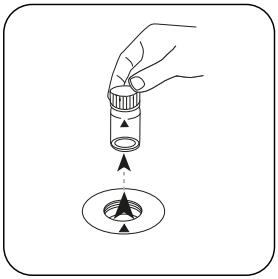
密封比色杯。



将**样本比色杯**放入测量轴中。注意定位。

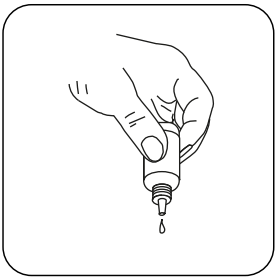


按下 **ZERO** 按钮。

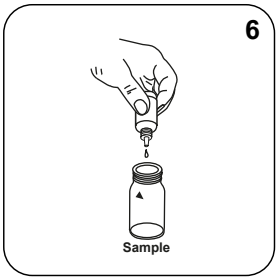


从测量轴上取下比色杯。

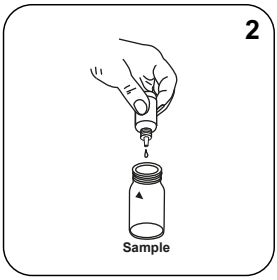
倒空比色杯。



垂直握住滴瓶，慢慢加入相同大小的滴剂。

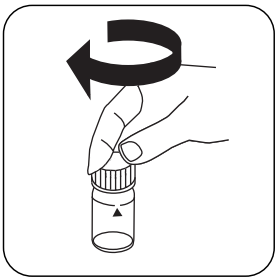


将 **6 滴 DPD 1 Buffer Solution** 添加到样本比色杯中。

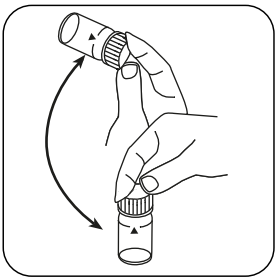


将 **2 滴 DPD 1 Reagent Solution** 添加到样本比色杯中。

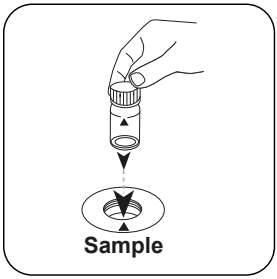
用**样本**将比色杯填充至**10 mL 刻度**处。



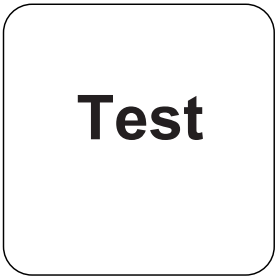
密封比色杯。



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。



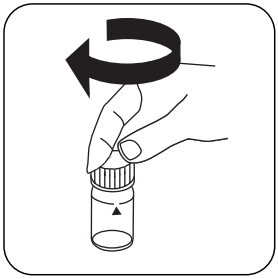
按下 **TEST** (XD: **START**) 按钮。

结果在显示屏上显示为 mg / l 余氯。

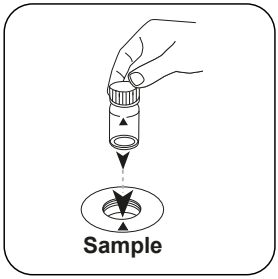
进行测定 总氯 水剂法

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。

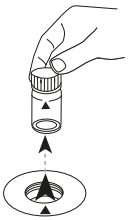


将**样本比色杯**放入测量轴中。注意定位。

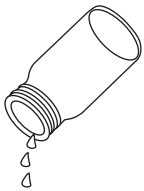
ZH

Zero

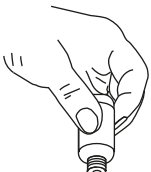
按下 **ZERO** 按钮。



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。

6

将 **6 滴 DPD 1 Buffer Solution** 添加到样本比色杯中。

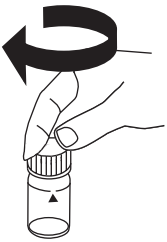
2

将 **2 滴 DPD 1 Reagent Solution** 添加到样本比色杯中。

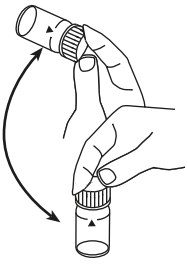
3

将 **3 滴 DPD 3 Solution** 添加到样本比色杯中。

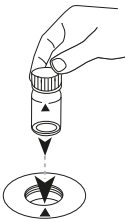
用**样本**将比色杯填充至 **10 mL 刻度**处。



密封比色杯。



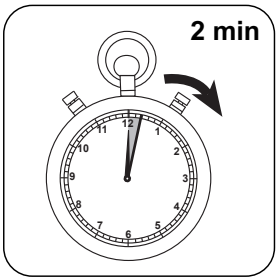
通过旋转混合内容物。



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

附錄

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）。

干擾	從/ [mg/l]
CrO_4^{2-}	0,01
MnO_2	0,01

一致性

EN ISO 7393-2

[a] 测定余氯，总氯和结合氯

HR (KI) T 氯 M105

5 - 200 mg/L Cl_2 CLHr

碘化钾 / 酸法

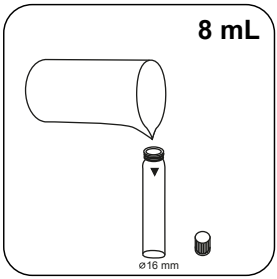
材料
所需材料（部分可選）：

ZH

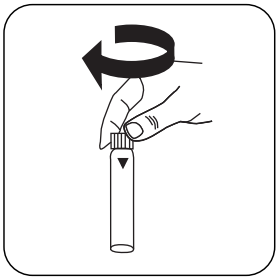
试剂	包装单位	货号
氯 HR (KI)	片剂 / 100	513000BT
氯 HR (KI)	片剂 / 250	513001BT
酸化 GP	片剂 / 100	515480BT
酸化 GP	片剂 / 250	515481BT
套件氯 HR (KI)/酸化 GP#	各100次	517721BT
套件氯 HR (KI)/酸化 GP#	各250次	517722BT
氯 HR (KI)	片剂 / 100	501210
氯 HR (KI)	片剂 / 250	501211

进行测定 HR (KI) 氯片剂

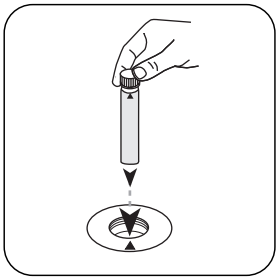
选择设备中的方法。



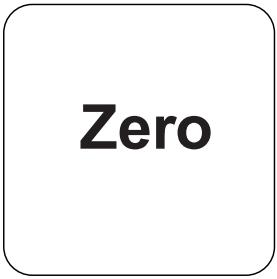
用 **8 mL 样本**填充 16 mm 比色杯。



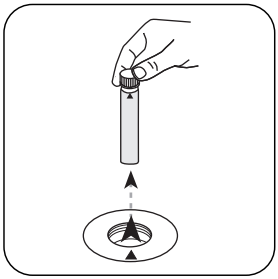
密封比色杯。



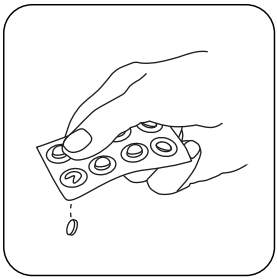
将**样本比色杯**放入测量轴中。注意定位。



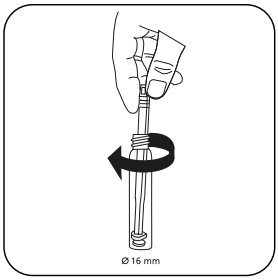
按下 **ZERO** 按钮。



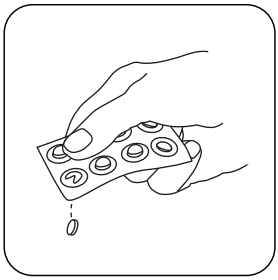
从测量轴上取下**比色杯**。



加入 **Chlorine HR (KI) 片剂**。

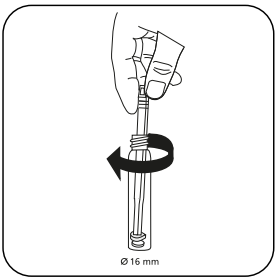


用轻微的扭转压碎片剂。

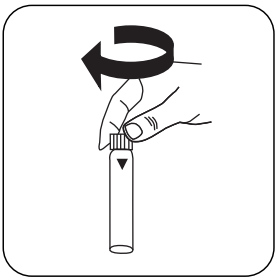


加入 **ACIDIFYING GP 片剂**。

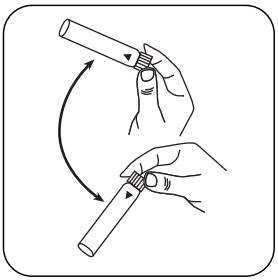
ZH



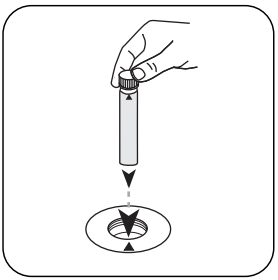
用轻微的扭转压碎片剂。



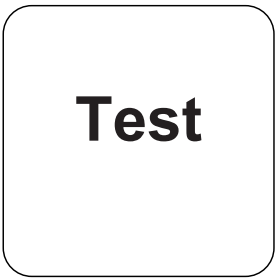
密封比色杯。



通过旋转溶解片剂。



将**样本比色杯**放入测量轴中。注意定位。



按下 **TEST** (XD: **START**) 按钮。

结果在显示屏上显示为 mg / l 氯。

化学方法

碘化钾 / 酸法

附錄

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。

方法验证

检出限	1.29 mg/L
测定下限	3.86 mg/L
测量上限	200 mg/L
灵敏度	83.96 mg/L / Abs
置信范围	1.14 mg/L
标准偏差	0.45 mg/L
变异系数	0.45 %

源于

EN ISO 7393-3

i含搅拌棒, 10cm

T 二氧化氯 M120

0.02 - 11 mg/L ClO_2 CLO2

DPD / 甘氨酸

材料
所需材料（部分可選）：

ZH

试剂	包装单位	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
甘氨酸 f)	片剂 / 100	512170BT
甘氨酸 f)	片剂 / 250	512171BT
DPD No.3 高钙 e)	片剂 / 100	515730BT
DPD No.3 高钙 e)	片剂 / 250	515731BT
DPD No.3 高钙 e)	片剂 / 500	515732BT
DPD No.1 高钙 e)	片剂 / 100	515740BT
DPD No.1 高钙 e)	片剂 / 250	515741BT
DPD No.1 高钙 e)	片剂 / 500	515742BT
套件 DPD No.1/No.3#	各100次	517711BT
套件 DPD No.1/No.3#	各250次	517712BT
套件 DPD No.1/甘氨酸 #	各100次	517731BT
套件 DPD No.1/甘氨酸 #	各250次	517732BT
套件 DPD No.1/No .3 高钙 #	各100次	517781BT
套件 DPD No.1/No .3 高钙 #	各250次	517782BT
DPD No.3 Evo	片剂 / 100	511420BT
DPD No.3 Evo	片剂 / 250	511421BT
DPD No.3 Evo	片剂 / 500	511422BT

取样

1. 在样本制备中，通过移液和摇动来避免的排气。
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，所以测定的二氧化氯结果可能会不足。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. 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）。

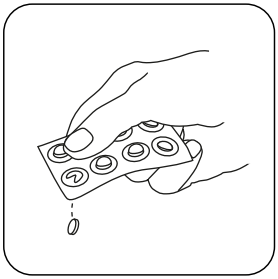
ZH

进行测定 二氧化氯, 有氯存在，片剂法

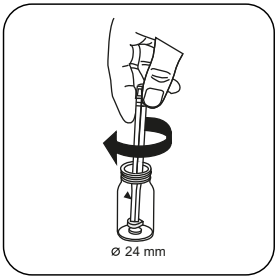
选择设备中的方法。

另外选择测定：**含氯**

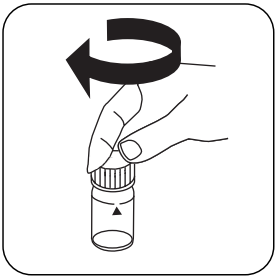
用 **10 mL 样本**填充 24 mm 比色杯。



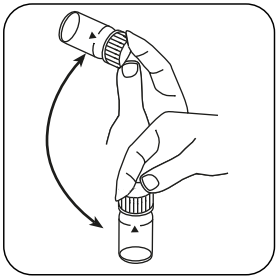
加入 **GLYCINE 片剂**。



用轻微的扭转压碎片剂。

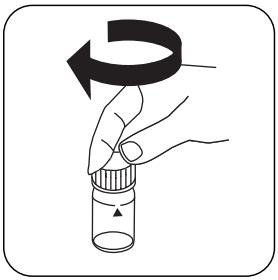


密封比色杯。

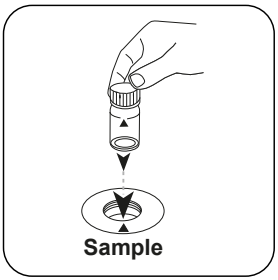


通过旋转溶解片剂。

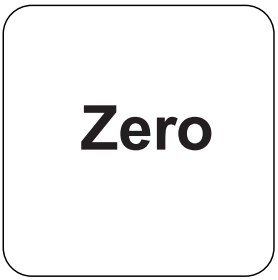
用 **10 mL 样本**填充**第二个比色杯**。



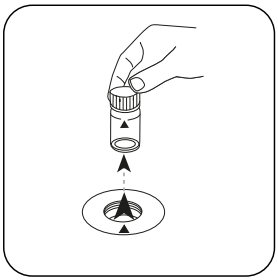
密封比色杯。



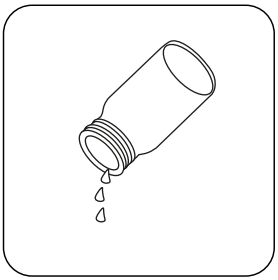
将**样本比色杯**放入测量轴中。注意定位。



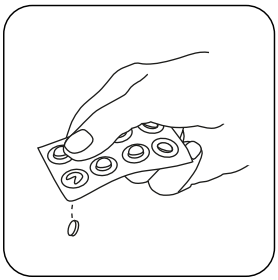
按下 **ZERO** 按钮。



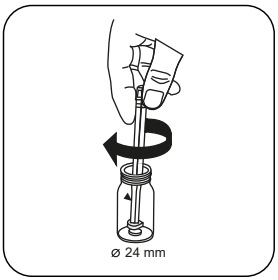
从测量轴上取下比色杯。



倒空比色杯。

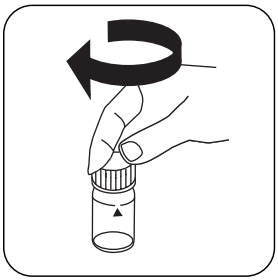


加入 **DPD No. 1 片剂** 。

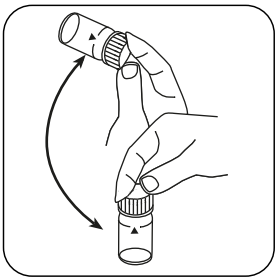


用轻微的扭转压碎片剂。

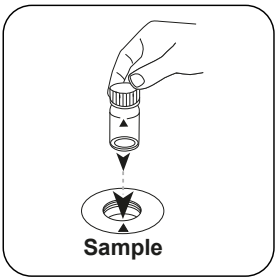
将准备好的**甘氨酸**加入到准备好的比色杯中。



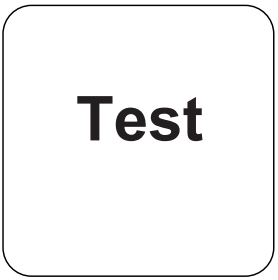
密封比色杯。



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

按下 **TEST** (XD: **START**) 按钮。

结果在显示屏上显示为 mg / l 二氧化氯。

分析

下表中输出数据也可转换为其他格式表示.

单位	参考表格	因素
mg/l	ClO_2	1
mg/l	Cl_2 frei	0.525
mg/l	Cl_2 geb.	0.525
mg/l	ges. Cl_2	0.525

化学方法

DPD / 甘氨酸

附錄

干扰说明

持续干扰

1. 存在于样本中的所有氧化剂都导致多重结果。

可消除干扰

1. 高于 19 mg/L 二氧化氯的浓度可导致测量范围内的结果高达 0 mg/L。在这种情况下应用不含二氧化氯的水稀释水样。将 10 ml 稀释的样本与试剂混合并重复测量。

源于

DIN 38408, 第 5 部分

[e] 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浊水样分析 | [f] 附加试剂，用于含氯水样，进行溴，二氧化氯和臭氧的测定分析 | [#] i含搅拌棒, 10cm

Tintometer GmbH
Lovibond® Water Testing
Schleefstraße 8-12
44287 Dortmund
Tel.: +49 (0)231/94510-0
sales@lovibond.com
www.lovibond.com
Germany

The Tintometer Limited
Lovibond House
Sun Rise Way
Amesbury, SP4 7GR
Tel.: +44 (0)1980 664800
Fax: +44 (0)1980 625412
sales@lovibond.uk
www.lovibond.com
UK

Tintometer China
9F, SOHO II C.
No.9 Guanghualu,
Chaoyang District,
Beijing, 100020
Customer Care China Tel.: 4009021628
Tel.: +86 10 85251111 Ext. 330
Fax: +86 10 85251001
chinaoffice@tintometer.com
www.lovibond.com
China

Tintometer South East Asia
Unit B-3-12, BBT One Boulevard,
Lebuh Nilam 2, Bandar Bukit Tinggi,
Klang, 41200, Selangor D.E
Tel.: +60 (0)3 3325 2285/6
Fax: +60 (0)3 3325 2287
lovibond.asia@tintometer.com
www.lovibond.com
Malaysia

Tintometer Brazil
Caixa Postal: 271
CEP: 13201-970
Jundiaí – SP
Tel.: +55 (11) 3230-6410
sales@lovibond.us
www.lovibond.com.br
Brazil

Tintometer Inc.
6456 Parkland Drive
Sarasota, FL 34243
Tel: 941.756.6410
Fax: 941.727.9654
sales@lovibond.us
www.lovibond.us
USA

Tintometer India Pvt. Ltd.
Door No: 7-2-C-14, 2nd, 3rd & 4th Floor
Sanathnagar Industrial Estate,
Hyderabad, 500018
Telangana
Tel: +91 (0) 40 23883300
Toll Free: 1 800 599 3891/ 3892
indiaoffice@lovibond.in
www.lovibondwater.in
India

Tintometer Spain
Postbox: 24047
08080 Barcelona
Tel.: +34 661 606 770
sales@tintometer.es
www.lovibond.com
Spain

Technical changes without notice
Printed in Germany 07/24
No.: 00386467