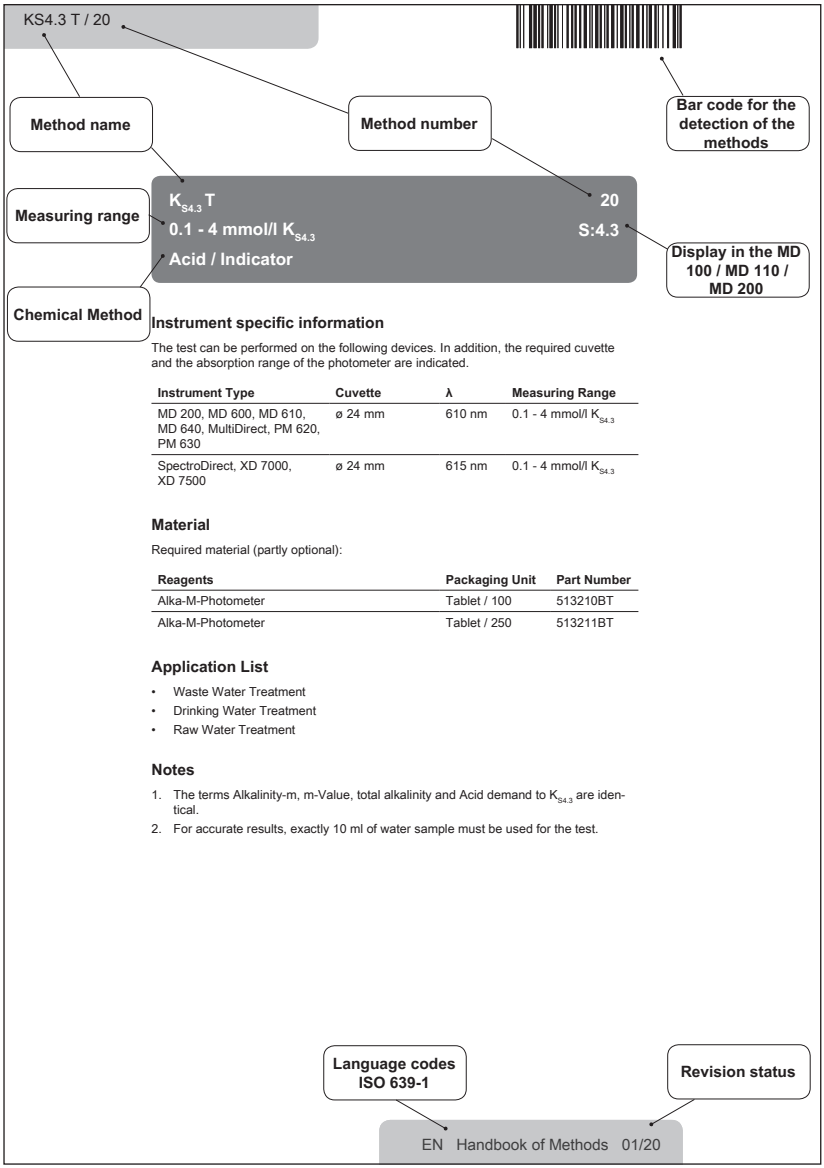
Lovibond® Water Testing

Tintometer® Group

Manual of Methods

MD 100 • MD 110 • MD 200

COD



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

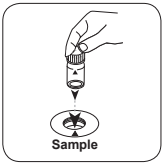
Implementation of the provision Acid capacity $K_{S4.3}$ with Tablet

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**.

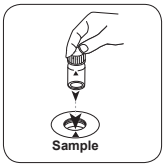
Close vial(s).



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.

COD LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
COD LR/25	25 pc.	2420720
COD LR/25, mercury free	25 pc.	2420710
COD LR/150	150 pc.	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 pc.	48371225
Validcheck COD 120 mg/L + TOC 48 mg/L	1 pc.	48371425
ValidCheck WW Effluent Multistandard NH_4-N/COD/TOC/NO_3-N/PO_4-P/TP	1 pc.	48399612

The following accessories are required.

Accessories	Packaging Unit	Part Number
Thermoreactor RD 125	1 pc.	2418940

Notes

1. The blank is stable when stored in the dark.
2. Blanks and test vials must be from the same batch.
3. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Removal of high Chloride concentration in COD samples

Chloride content may interfere during COD determination, if the tolerance level of the used test will be exceeded. To overcome that problem the following sample pretreatment can be used:

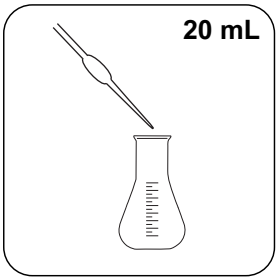
Equipment:

- 2 Erlenmeyer flasks 300 mL with NS 29/32 connection
- 2 HCl absorber according to DIN 38409
- 2 glass stoppers NS 29/32
- Pipettes for volumes of 20 and 25ml
- Magnetic stirrer and magnetic stirring rods
- Thermometer to measure 0 - 100 °C
- Ice bath

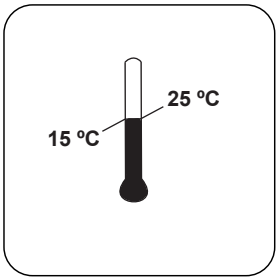
Reagents:

- 12 to 14 g of sodalime
- 50 mL H_2SO_4 (95 - 97%, 1.84 g/ml, CSB free)
- Hydrochloric acid 10 % to clean absorber from residual lime

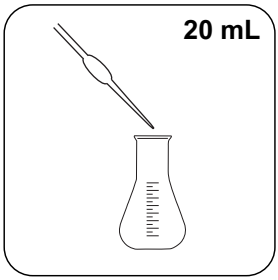
The work must be carried out under a fume hood!



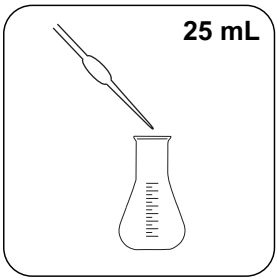
Put **20 mL homogenised sample** in the erlenmeyer flask.



Add the magnetic stirring rod, and cool in the ice bath.

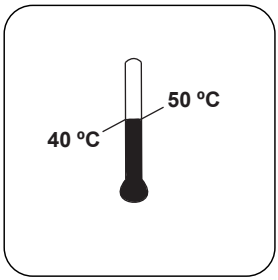


Put **20 mL deionized water** in the second erlenmeyer flask.



Add slowly **25 mL concentrated Sulfuric acid** each under cooling and stirring.

Sample will be hot!



Temperature should not exceed 40 to 50 °C.

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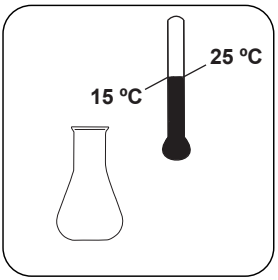
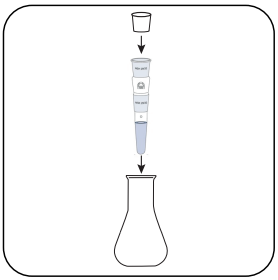
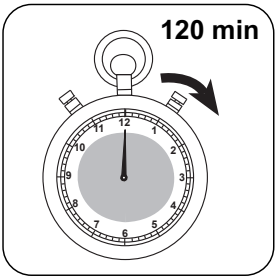


After the complete addition of the sulfuric acid, cool to room temperature in the ice bath.

Add **6 - 7 g soda lime powder** into the absorption tubes.



Close the absorption tubes with a plug and fit onto the Erlenmeyer flasks.

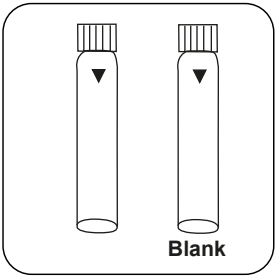


Stir at about 250 rpm for **120 minutes** at room temperature (a turbidity may be formed).

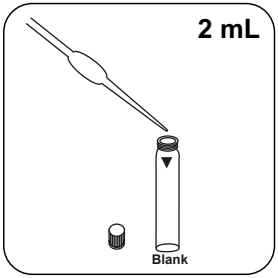
This sample is used for the analysis of COD. Due to this pretreatment procedure the original sample has been diluted by a factor of 2.05.
$CSB_{sample} = CSB_{display} \times 2.05$

Determination of COD LR with Vario Vial Test

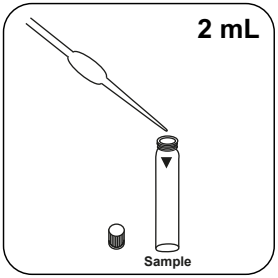
Select the method on the device.



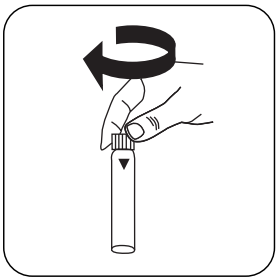
Prepare two **reaction vials**. Mark one as a blank.



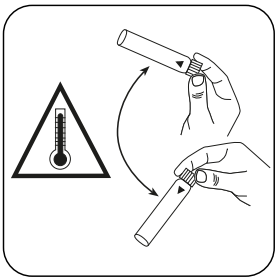
Put **2 mL deionised water** in the blank.



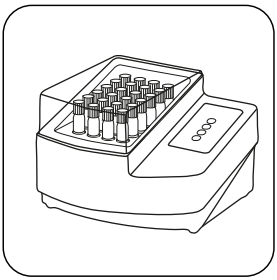
Put **2 mL sample** in the sample vial.



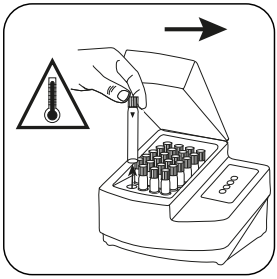
Close vial(s).



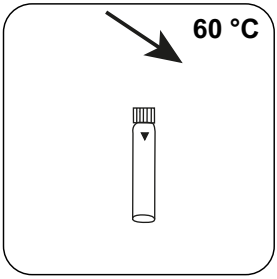
Carefully invert several times to mix the contents. **Note: Will get hot!**



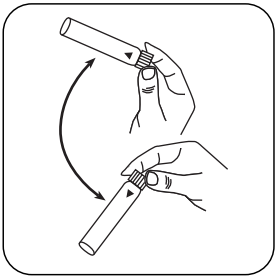
Seal the vials in the pre-heated thermoreactor for **120 minutes at 150 °C** .



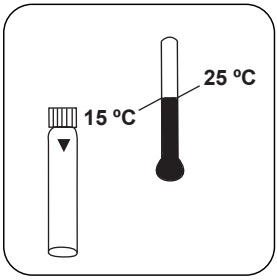
Remove the vial from the thermoreactor. **(Note: vial will be hot!)**



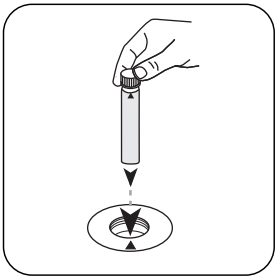
Allow vial(s) to cool to 60 °C.



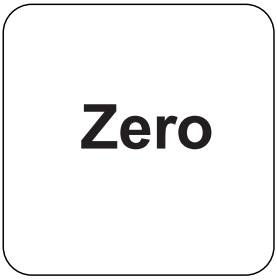
Invert several times to mix the contents.



Allow the vial to cool to room temperature and then measure.

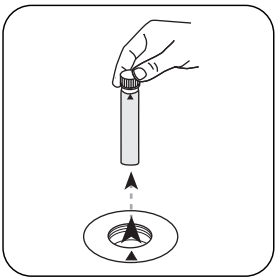


Place **blank** in the sample chamber. • Pay attention to the positioning.

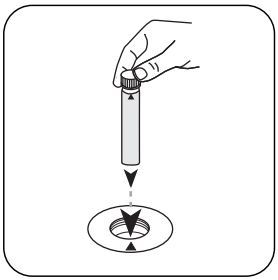


Press the **ZERO** button.

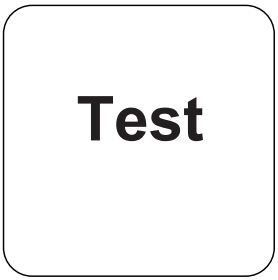
EN



Remove **vial** from the sample chamber.



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



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

The result in mg/L COD appears on the display.

Chemical Method

Dichromate / H_2SO_4

Appendix

Interferences

Persistant Interferences

- In exceptional cases, contents, for which the oxidation capacity of the reagent is not sufficient, can lead to lower results.

Removeable Interferences

- Suspended solids in the vial can lead to incorrect measurements and so to avoid this, it is important to place the vials carefully in the sample chamber as the method necessitates a build-up of precipitate at the bottom of the vial.
- The outer walls of the vial must be clean and dry before the analysis is carried out. Fingerprints or water droplets on the vial lead to incorrect measurements.
- In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here.

Method Validation

Limit of Detection	3.2 mg/L
Limit of Quantification	9.7 mg/L
End of Measuring Range	150 mg/L
Sensitivity	-272 mg/L / Abs
Confidence Intervall	3.74 mg/L
Standard Deviation	1.55 mg/L
Variation Coefficient	2.02 %

Conformity

ISO 15705:2002

According to

ISO 15705:2002
DIN 38409 part 41

[b] Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C)

COD MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
COD MR/25	25 pc.	2420721
COD MR/25, mercury free	25 pc.	2420711
COD MR/150	150 pc.	2420726
COD MR/150, mercury free	150 pc.	2420716
ValidCheck COD 500 mg/L + TOC 200 mg/L	1 pc.	48371625
ValidCheck WW Influent Multistandard NH_4-N/COD/TOC/NO_3-N/PO_4-P/TP	1 pc.	48399712

The following accessories are required.

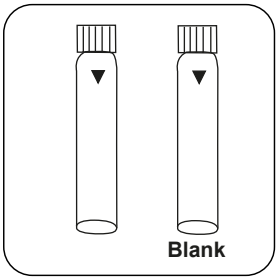
Accessories	Packaging Unit	Part Number
Thermoreactor RD 125	1 pc.	2418940

Notes

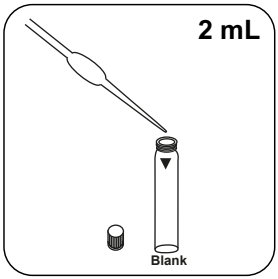
1. The blank is stable when stored in the dark. Blanks and test vials must be from the same batch.
2. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.
3. For samples under 100 mg/L COD it is recommended to to use the tube test COD LR if a higher degree of accuracy is required.

Determination of COD MR with Vario Vial Test

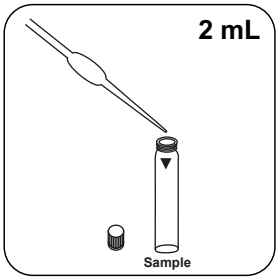
Select the method on the device.



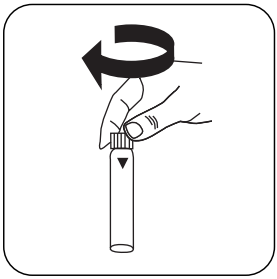
Prepare two **reaction vials**. Mark one as a blank.



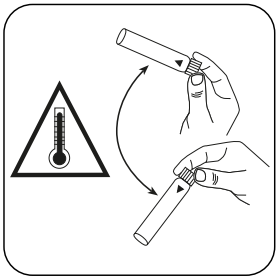
Put **2 mL deionised water** in the blank.



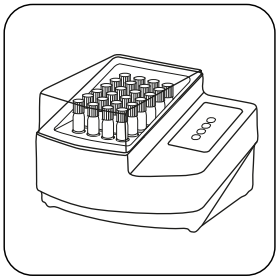
Put **2 mL sample** in the sample vial.



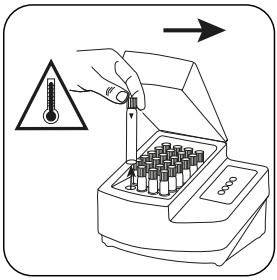
Close vial(s).



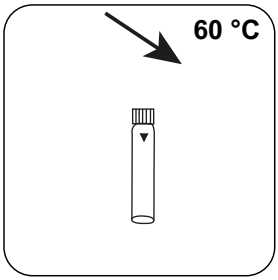
Carefully invert several times to mix the contents. **Note: Will get hot!**



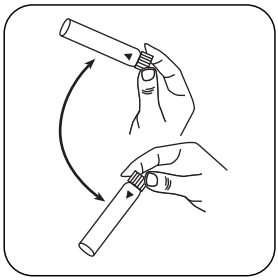
Seal the vials in the pre-heated thermoreactor for **120 minutes at 150 °C** .



Remove the vial from the thermoreactor. **(Note: vial will be hot!)**

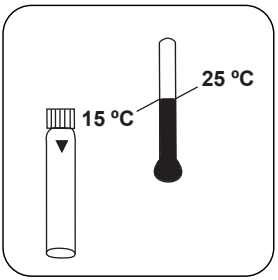


Allow vial(s) to cool to 60 °C.

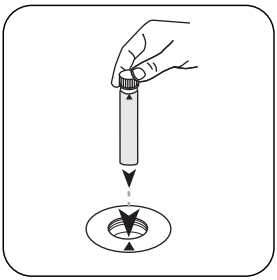


Invert several times to mix the contents.

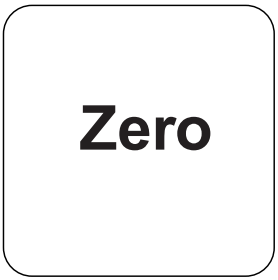
EN



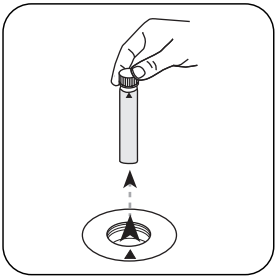
Allow the vial to cool to room temperature and then measure.



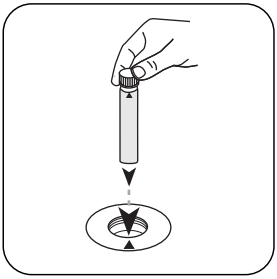
Place **blank** in the sample chamber. • Pay attention to the positioning.



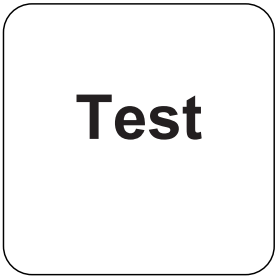
Press the **ZERO** button.



Remove **vial** from the sample chamber.



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



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

The result in mg/L COD appears on the display.

Chemical Method

Dichromate / H_2SO_4

Appendix

Interferences

Persistant Interferences

- In exceptional cases, contents, for which the oxidation capacity of the reagent is not sufficient, can lead to lower results.

Removeable Interferences

- Suspended solids in the vial can lead to incorrect measurements and so to avoid this, it is important to place the vials carefully in the sample chamber as the method necessitates a build-up of precipitate at the bottom of the vial.
- The outer walls of the vial must be clean and dry before the analysis is carried out. Fingerprints or water droplets on the vial lead to incorrect measurements.
- In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. To remove high chloride concentrations in COD samples, see method M130 COD LR TT.

Method Validation

Limit of Detection	8.66 mg/L
Limit of Quantification	25.98 mg/L
End of Measuring Range	1500 mg/L
Sensitivity	2,141 mg/L / Abs
Confidence Intervall	18.82 mg/L
Standard Deviation	7.78 mg/L
Variation Coefficient	1.04 %

Conformity

ISO 15705:2002

According to

ISO 15705:2002
DIN 38409 part 43

[b] Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C)

COD HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
COD HR/25	25 pc.	2420722
COD HR/25, mercury free	25 pc.	2420712
COD HR/150	150 pc.	2420727
ValidcCheck COD 5000 mg/L + TOC 2002 mg/L	1 pc.	48371825

The following accessories are required.

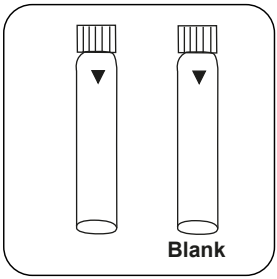
Accessories	Packaging Unit	Part Number
Thermoreactor RD 125	1 pc.	2418940
Pipette, 200 µl	1 pc.	365042
Pipette Tips	1 pc.	365032

Notes

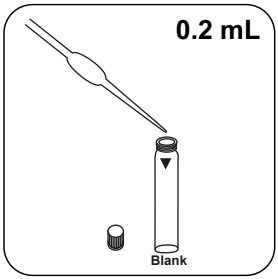
1. The blank is stable when stored in the dark. Blanks and test vials must be from the same batch.
2. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.
3. For samples under 1 g/L COD it is recommended to repeat the test with the test kit for COD MR or for samples under 0.1 g/L COD to use the tube test COD LR if a higher degree of accuracy is required.

Determination of CSB HR with Vario Vial Test

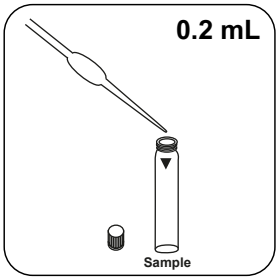
Select the method on the device.



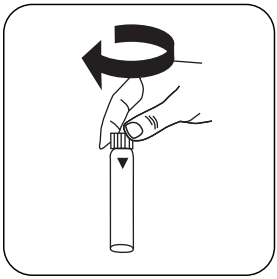
Prepare two **reaction vials**. Mark one as a blank.



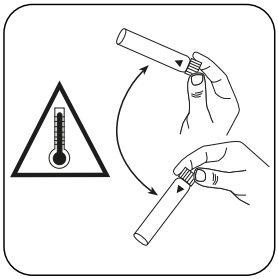
Put **0.2 mL deionised water** in the blank.



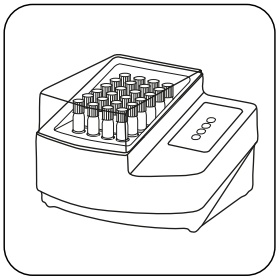
Put **0.2 mL sample** in the sample vial.



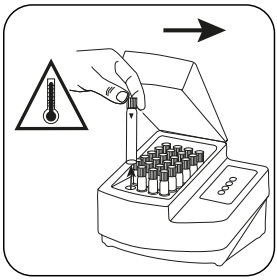
Close vial(s).



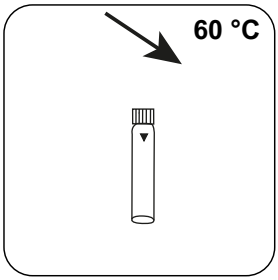
Carefully invert several times to mix the contents. **Note: Will get hot!**



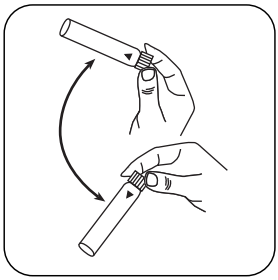
Seal the vials in the pre-heated thermoreactor for **120 minutes at 150 °C** .



Remove the vial from the thermoreactor. **(Note: vial will be hot!)**

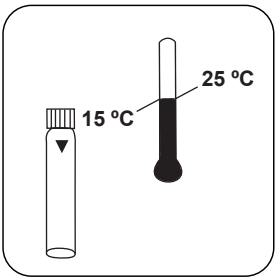


Allow vial(s) to cool to 60 °C.

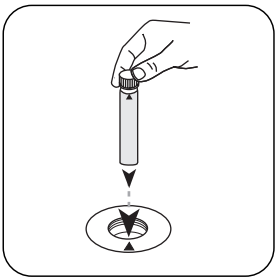


Invert several times to mix the contents.

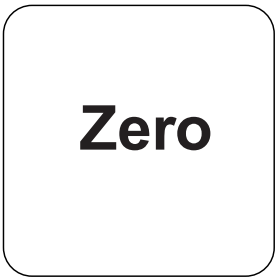
EN



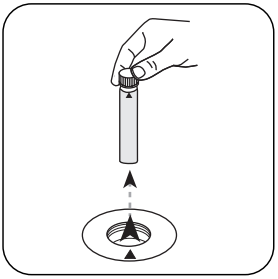
Allow the vial to cool to room temperature and then measure.



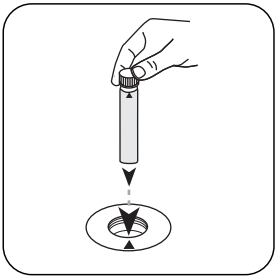
Place **blank** in the sample chamber. • Pay attention to the positioning.



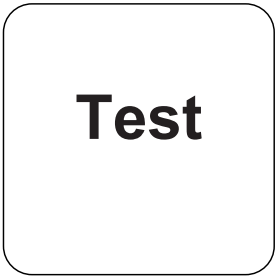
Press the **ZERO** button.



Remove **vial** from the sample chamber.



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



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

The result in g/L COD (XD: mg/L COD) appears on the display.

Chemical Method

Dichromate / H_2SO_4

Appendix

Interferences

Persistant Interferences

- In exceptional cases, contents, for which the oxidation capacity of the reagent is not sufficient, can lead to lower results.

Removeable Interferences

- Suspended solids in the vial can lead to incorrect measurements and so to avoid this, it is important to place the vials carefully in the sample chamber as the method necessitates a build-up of precipitate at the bottom of the vial.
- The outer walls of the vial must be clean and dry before the analysis is carried out. Fingerprints or water droplets on the vial lead to incorrect measurements.
- In the standard version, chloride interferes from a concentration of 10000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. To remove high chloride concentrations in COD samples, see method M130 COD LR TT.

Method Validation

Limit of Detection	112.81 mg/L
Limit of Quantification	338.43 mg/L
End of Measuring Range	15 g/L
Sensitivity	21,164 mg/L / Abs
Confidence Intervall	70.48 mg/L
Standard Deviation	27.84 mg/L
Variation Coefficient	0.37 %

Conformity

ISO 15705:2002

According to

ISO 15705:2002

[b] Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C)

COD LMR TT M133

15 - 300 mg/L COD[b)] LMr

Dichromate / H_2SO_4

EN

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
COD LMR/25	25 pc.	2423120
Validcheck COD 120 mg/L + TOC 48 mg/L	1 pc.	48371425

The following accessories are required.

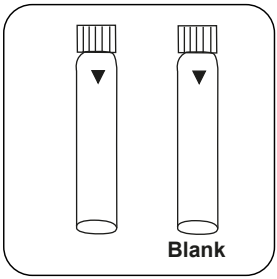
Accessories	Packaging Unit	Part Number
Thermoreactor RD 125	1 pc.	2418940

Notes

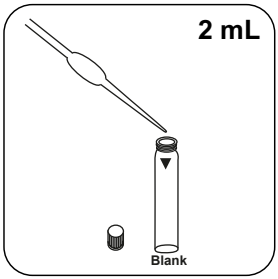
1. The blank is stable when stored in the dark. Blanks and test vials must be from the same batch.
2. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Determination of COD LMR with Vial Test

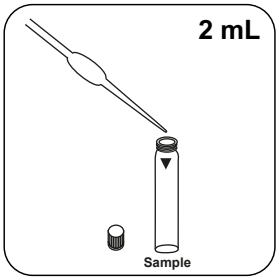
Select the method on the device.



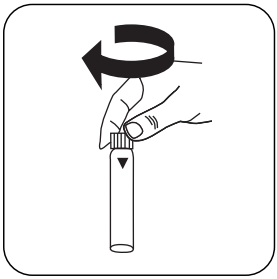
Prepare two **reaction vials**. Mark one as a blank.



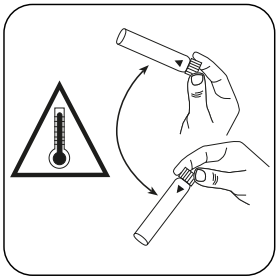
Put **2 mL deionised water** in the blank.



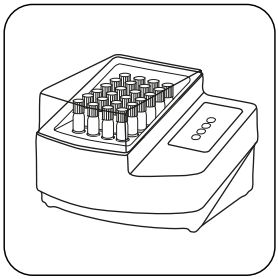
Put **2 mL sample** in the sample vial.



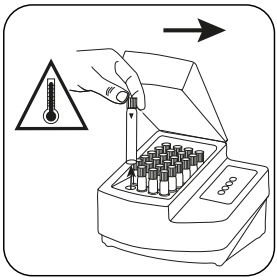
Close vial(s).



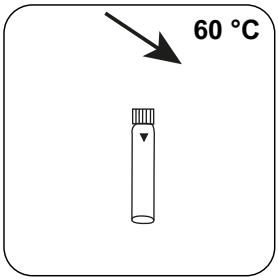
Carefully invert several times to mix the contents. **Note: Will get hot!**



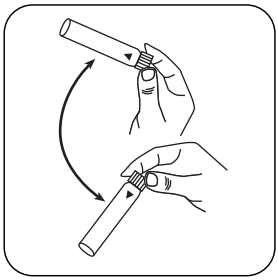
Seal the vials in the pre-heated thermoreactor for **120 minutes at 150 °C** .



Remove the vial from the thermoreactor. **(Note: vial will be hot!)**

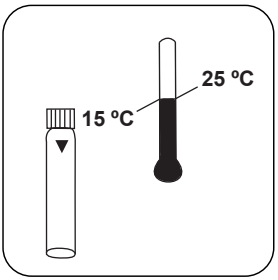


Allow vial(s) to cool to 60 °C.

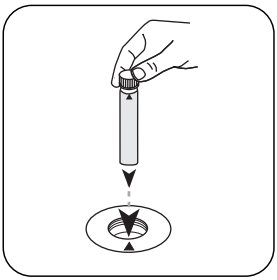


Invert several times to mix the contents.

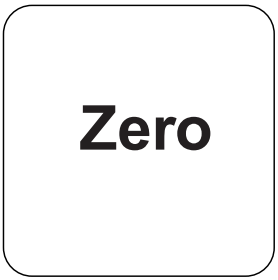
EN



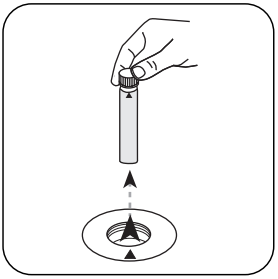
Allow the vial to cool to room temperature and then measure.



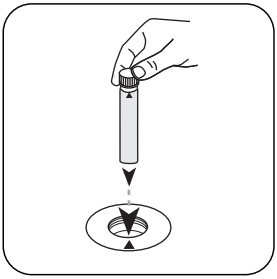
Place **blank** in the sample chamber. • Pay attention to the positioning.



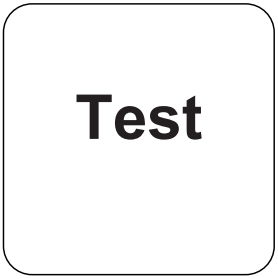
Press the **ZERO** button.



Remove **vial** from the sample chamber.



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



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

The result in mg/L COD appears on the display.

Chemical Method

Dichromate / H_2SO_4

Appendix

Interferences

Persistant Interferences

- In exceptional cases, contents, for which the oxidation capacity of the reagent is not sufficient, can lead to lower results.

Removeable Interferences

- Suspended solids in the vial can lead to incorrect measurements and so to avoid this, it is important to place the vials carefully in the sample chamber as the method necessitates a build-up of precipitate at the bottom of the vial.
- The outer walls of the vial must be clean and dry before the analysis is carried out. Fingerprints or water droplets on the vial lead to incorrect measurements.
- In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. To remove high chloride concentrations in COD samples, see method M130 COD LR TT.

Method Validation

Limit of Detection	5.7 mg/L
Limit of Quantification	17.2 mg/L
End of Measuring Range	300 mg/L
Sensitivity	-244 mg/L / Abs
Confidence Intervall	2.56 mg/L
Standard Deviation	1.06 mg/L
Variation Coefficient	0.67 %

Conformity

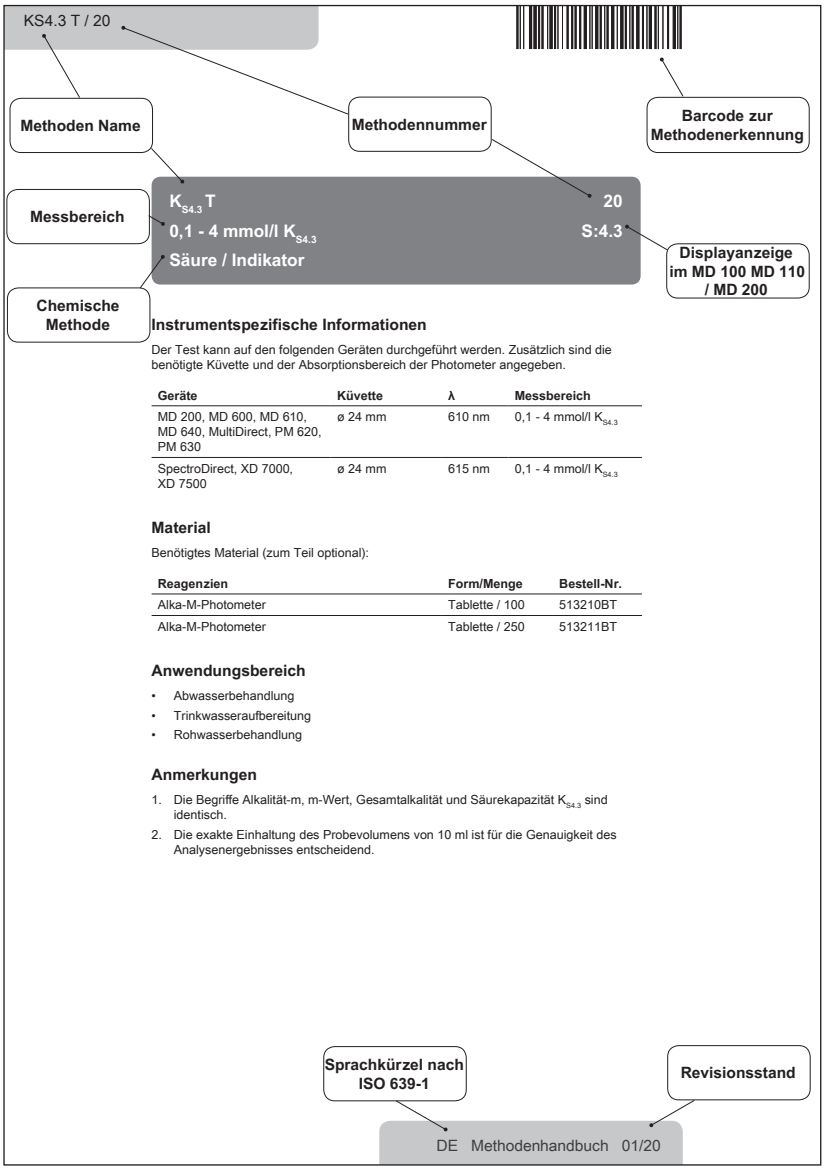
ISO 15705:2002

According to

ISO 15705:2002
DIN 38409 part 41

[b] Reactor is necessary for COD (150 °C), TOC (120 °C) and total -chromium, - phosphate, -nitrogen, (100 °C)

DE



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

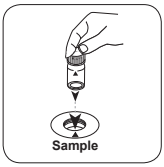
Durchführung der Bestimmung Säurekapazität $K_{S4.3}$ mit Tablette

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.

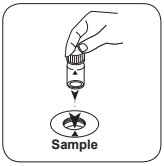
Küvette(n) verschließen.



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 $K_{S4.3}$.

CSB LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
CSB LR/25	25 St.	2420720
CSB LR/25, quecksilberfrei	25 St.	2420710
CSB LR/150	150 St.	2420725
ValidCheck CSB 40 mg/L + TOC 16 mg/L	1 St.	48371225
ValidCheck CSB 120 mg/L + TOC 48 mg/L	1 St.	48371425
ValidCheck WW Effluent Multistandard NH_4-N/COD/TOC/NO_3-N/PO_4-P/TP	1 St.	48399612

Es wird außerdem folgendes Zubehör benötigt.

Zubehör	Verpackungseinheit	Bestell-Nr.
Thermoreaktor RD 125	1 St.	2418940

Anmerkungen

1. Die Nullküvette ist bei Lagerung im Dunkeln stabil.
2. Nullküvette und Testküvette müssen aus demselben Batch sein.
3. Die Küvetten dürfen nicht heiß in den Küvettenschacht gestellt werden. Die stabilsten Messwerte werden ermittelt, wenn die Küvetten über Nacht stehen gelassen werden.

Entfernung hoher Chloridkonzentration in CSB-Proben

Wenn der Chlorid-Gehalt die Toleranz des verwendeten Tests überschreitet, kann es während einer CSB-Bestimmung zu Störungen kommen. Um dieses Problem zu vermeiden, sollte die folgende Probenvorbehandlung durchgeführt werden:

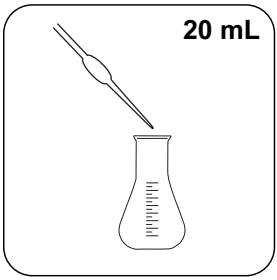
Zubehör:

- 2 Erlenmeyerkolben 300 mL mit NS 29/32-Anschluss
- 2 HCl Absorber nach DIN 38409
- 2 Glasstopfen mit NS 29/32
- Pipetten für 20 mL und 25 mL
- Magnetrührer und Magnetrührstäbe
- Thermometer (Messbereich: 0 - 100 °C)
- Eisbad

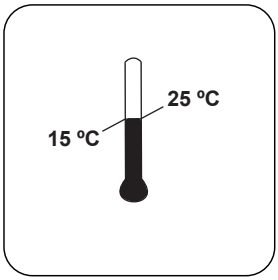
Reagenzien:

- 12 - 14 g Natronkalk
- 50 mL H_2SO_4 (95 - 97%, 1.84 g/ mL, CSB-frei)
- Salzsäure 10%, zum Reinigen des Absorbers von Kalkresten

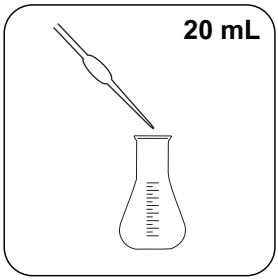
Die Arbeiten müssen unter einem Abzug durchgeführt werden!



20 mL homogenisierte Probe in den Erlenmeyerkolben geben.

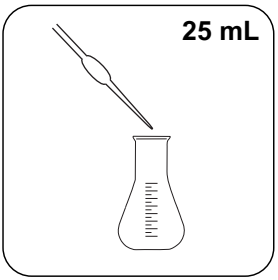


Den Magnetrührstab hinzufügen und im Eisbad abkühlen lassen.



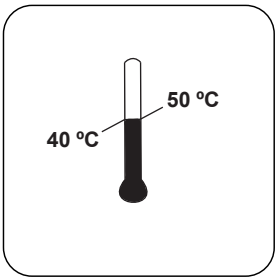
20 mL VE-Wasser in den zweiten Erlenmeyerkolben geben.

DE

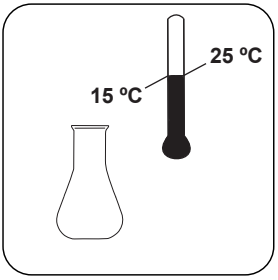


Jeweils 25 mL konzentrierte Schwefelsäure langsam unter Kühlen und Rühren zugeben.

Probe wird heiß!

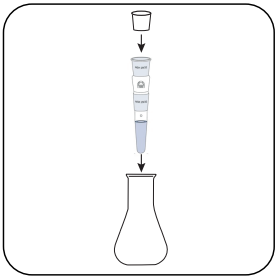


Die Temperatur sollte 40 - 50 °C nicht überschreiten.

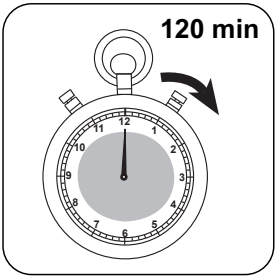


Nach vollständiger Zugabe der Schwefelsäure im Eisbad auf Raumtemperatur abkühlen lassen.

6 - 7 g Natronkalk Pulver in das Absorptionsröhrchen geben.



Das Absorptionsröhrchen mit einem Stopfen verschließen und auf den Erlenmeyerkolben aufsetzen.

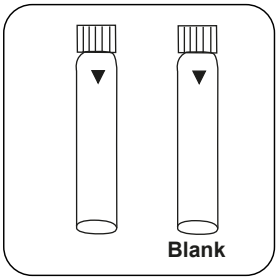


Bei Raumtemperatur mit ca. 250 U / min **120 Minuten** rühren (es kann sich eine Trübung bilden).

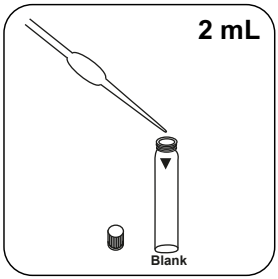
Diese Probe für die Analyse von CSB verwenden. Durch diese Vorbehandlung wurde die Originalprobe um den Faktor 2,05 verdünnt.
CSB_{Probe} = CSB Anzeige x 2,05

Durchführung der Bestimmung CSB LR mit Vario Küvettentest

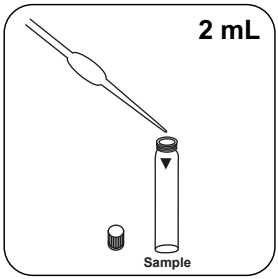
Die Methode im Gerät auswählen.



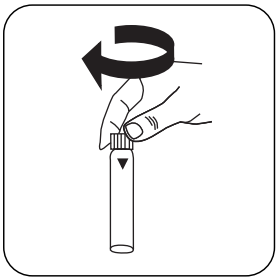
Zwei **Reagenzküvetten** bereitstellen. Eine als Nullküvette kennzeichnen.



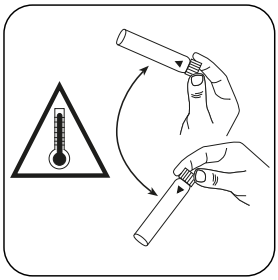
2 mL VE-Wasser in die Nullküvette geben.



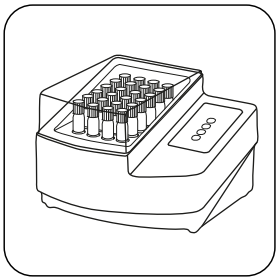
2 mL Probe in die Probenküvette geben.



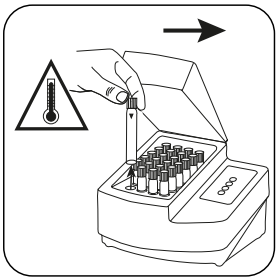
Küvette(n) verschließen.



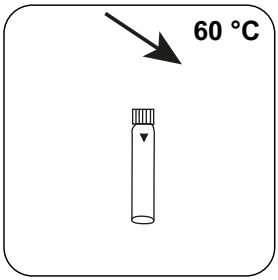
Inhalt durch vorsichtiges Umschwenken vermischen. **Achtung: Wärmeentwicklung!**



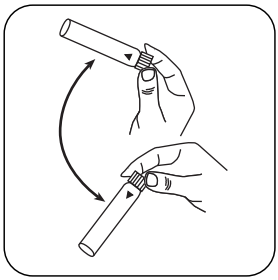
Küvette(n) in vorgeheiztem Thermoreaktor für **120 Minuten bei 150 °C** aufschließen.



Küvette aus dem Thermoreaktor nehmen. **(Achtung: Küvette ist heiß!)**

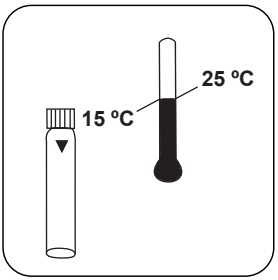


Küvette(n) auf etwa 60 °C abkühlen lassen.

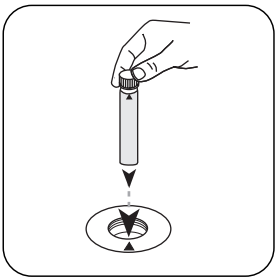


Inhalt durch Umschwenken mischen.

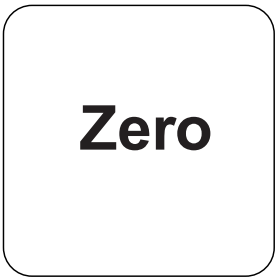
DE



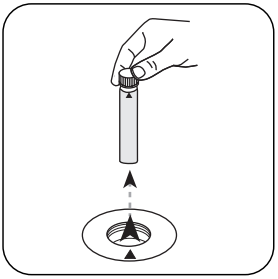
Die Küvette erst auf Raumtemperatur abkühlen lassen, dann vermessen.



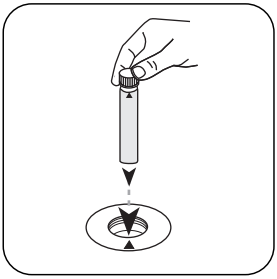
Die **Nullküvette** in den Messschacht stellen. Positionierung beachten.



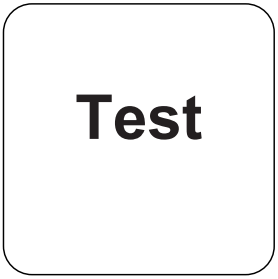
Taste **ZERO** drücken.



Die **Küvette** aus dem Messschacht nehmen.



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



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

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

Chemische Methode

Dichromate / H_2SO_4

Appendix

Störungen

Permanente Störungen

- In Ausnahmefällen können Inhaltsstoffe, für die das Oxidationsvermögen des Reagenzes nicht ausreicht, zu Minderbefunden führen.

Ausschließbare Störungen

- Um Fehlmessungen durch Schwebstoffe zu verhindern, ist es wichtig die Küvetten vorsichtig in den Messschacht einzusetzen, da sich methodenbedingt ein Niederschlag auf dem Boden der Küvetten bildet.
- Die Außenwände der Küvetten müssen sauber und trocken sein, bevor die Analyse durchgeführt wird. Fingerabdrücke oder Wassertropfen auf der Küvette führen zu Fehlmessungen.
- Bei der Standard Version stört Chlorid ab einer Konzentration von 1000 mg/L. Bei der quecksilberfreien Version hängt die Störung von der Chlorid-Konzentration und dem CSB ab. Konzentrationen ab 100 mg/L Chlorid können hier zu deutlichen Störungen führen.

Methodenvalidierung

Nachweisgrenze	3.2 mg/L
Bestimmungsgrenze	9.7 mg/L
Messbereichsende	150 mg/L
Empfindlichkeit	-272 mg/L / Abs
Vertrauensbereich	3.74 mg/L
Verfahrensstandardabweichung	1.55 mg/L
Verfahrensvariationskoeffizient	2.02 %

Konform

ISO 15705:2002

Gemäß

ISO 15705:2002
DIN 38409 Teil 41

[b] Reaktor erforderlich für CSB (150 °C), TOC (120 °C) und Gesamt -chrom, - phosphat, -stickstoff, (100 °C)

CSB MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
CSB MR/25	25 St.	2420721
CSB MR/25, quecksilberfrei	25 St.	2420711
CSB MR/150	150 St.	2420726
CSB MR/150, quecksilberfrei	150 St.	2420716
ValidCheck CSB 500 mg/L + TOC 200 mg/L	1 St.	48371625
ValidCheck WW Influent Multistandard NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 St.	48399712

Es wird außerdem folgendes Zubehör benötigt.

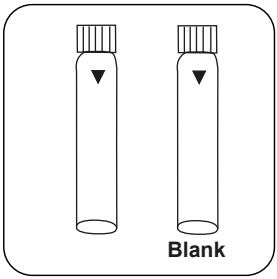
Zubehör	Verpackungseinheit	Bestell-Nr.
Thermoreaktor RD 125	1 St.	2418940

Anmerkungen

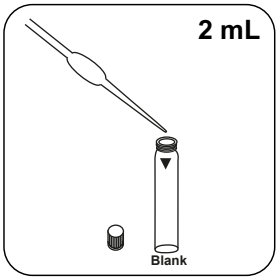
1. Die Nullküvette ist bei Lagerung im Dunkeln stabil. Nullküvette und Testküvette müssen aus demselben Batch sein.
2. Die Küvetten dürfen nicht heiß in den Küvettenschacht gestellt werden. Die stabilsten Messwerte werden ermittelt, wenn die Küvetten über Nacht stehen gelassen werden.
3. Bei Proben mit einem CSB kleiner 100 mg/L wird empfohlen, den Küvettensatz CSB LR zu verwenden, wenn eine höhere Genauigkeit erwünscht ist.

Durchführung der Bestimmung CSB MR mit Vario Küvettentest

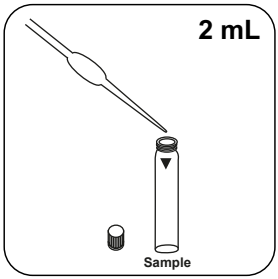
Die Methode im Gerät auswählen.



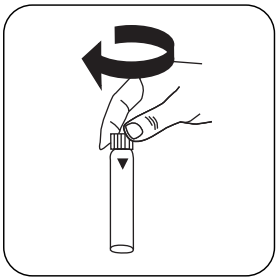
Zwei **Reagenzküvetten** bereitstellen. Eine als Nullküvette kennzeichnen.



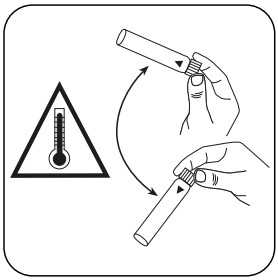
2 mL VE-Wasser in die Nullküvette geben.



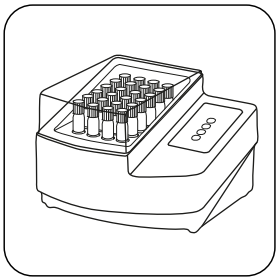
2 mL Probe in die Probenküvette geben.



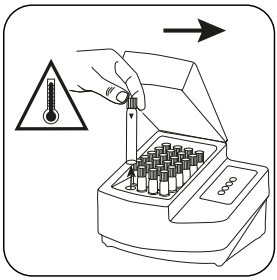
Küvette(n) verschließen.



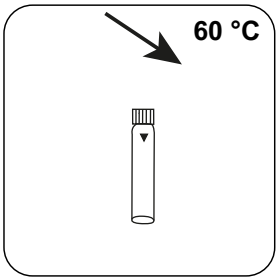
Inhalt durch vorsichtiges Umschwenken vermischen. **Achtung: Wärmeentwicklung!**



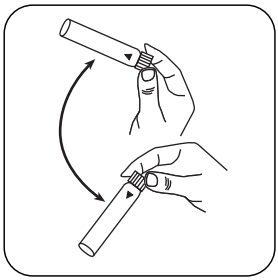
Küvette(n) in vorgeheiztem Thermoreaktor für **120 Minuten bei 150 °C** aufschließen.



Küvette aus dem Thermoreaktor nehmen. **(Achtung: Küvette ist heiß!)**

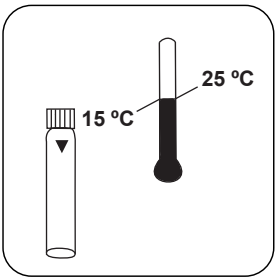


Küvette(n) auf etwa 60 °C abkühlen lassen.

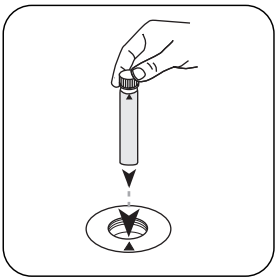


Inhalt durch Umschwenken mischen.

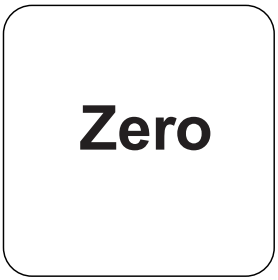
DE



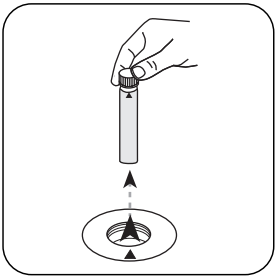
Die Küvette erst auf Raumtemperatur abkühlen lassen, dann vermessen.



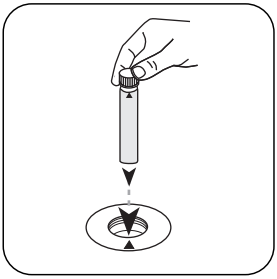
Die **Nullküvette** in den Messschacht stellen. Positionierung beachten.



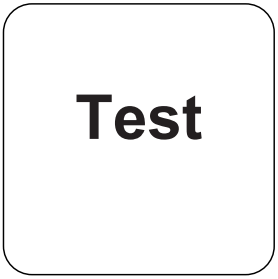
Taste **ZERO** drücken.



Die **Küvette** aus dem Messschacht nehmen.



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



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

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

Chemische Methode

Dichromate / H_2SO_4

Appendix

Störungen

Permanente Störungen

- In Ausnahmefällen können Inhaltsstoffe, für die das Oxidationsvermögen des Reagenzes nicht ausreicht, zu Minderbefunden führen.

Ausschließbare Störungen

- Um Fehlmessungen durch Schwebstoffe zu verhindern, ist es wichtig die Küvetten vorsichtig in den Messschacht einzusetzen, da sich methodenbedingt ein Niederschlag auf dem Boden der Küvetten bildet.
- Die Außenwände der Küvetten müssen sauber und trocken sein, bevor die Analyse durchgeführt wird. Fingerabdrücke oder Wassertropfen auf der Küvette führen zu Fehlmessungen.
- Bei der Standard Version stört Chlorid ab einer Konzentration von 1000 mg/L. Bei der quecksilberfreien Version hängt die Störung von der Chlorid-Konzentration und dem CSB ab. Konzentrationen ab 100 mg/L Chlorid können hier zu deutlichen Störungen führen. Zur Entfernung hoher Chlorid Konzentration in CSB-Proben, siehe Methode M130 CSB LR TT.

Methodenvalidierung

Nachweisgrenze	8.66 mg/L
Bestimmungsgrenze	25.98 mg/L
Messbereichsende	1500 mg/L
Empfindlichkeit	2,141 mg/L / Abs
Vertrauensbereich	18.82 mg/L
Verfahrensstandardabweichung	7.78 mg/L
Verfahrensvariationskoeffizient	1.04 %

Konform

ISO 15705:2002

Gemäß

ISO 15705:2002
DIN 38409 Teil 43

[b] Reaktor erforderlich für CSB (150 °C), TOC (120 °C) und Gesamt -chrom, - phosphat, -stickstoff, (100 °C)

CSB HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
CSB HR/25	25 St.	2420722
CSB HR/25, quecksilberfrei	25 St.	2420712
CSB HR/150	150 St.	2420727
ValidCheck CSB 5000 mg/L + TOC 2002 mg/L	1 St.	48371825

Es wird außerdem folgendes Zubehör benötigt.

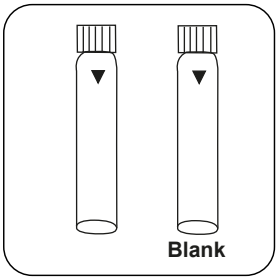
Zubehör	Verpackungseinheit	Bestell-Nr.
Thermoreaktor RD 125	1 St.	2418940
Pipette 200 µl	1 St.	365042
Pipettenspitzen	1 St.	365032

Anmerkungen

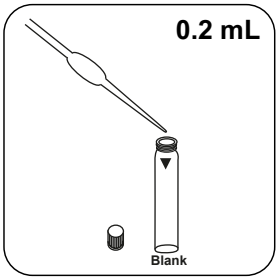
1. Die Nullküvette ist bei Lagerung im Dunkeln stabil. Nullküvette und Testküvette müssen aus demselben Batch sein.
2. Die Küvetten dürfen nicht heiß in den Küvettenschacht gestellt werden. Die stabilsten Messwerte werden ermittelt, wenn die Küvetten über Nacht stehen gelassen werden.
3. Bei Proben mit einem CSB kleiner 1 g/L wird empfohlen, den Küvettensatz CSB MR, bzw. bei Proben kleiner 0,1 g/L den Küvettensatz CSB LR zu verwenden, wenn eine höhere Genauigkeit erwünscht ist.

Durchführung der Bestimmung CSB HR mit Vario Küvettentest

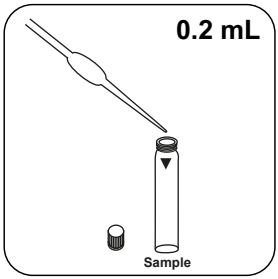
Die Methode im Gerät auswählen.



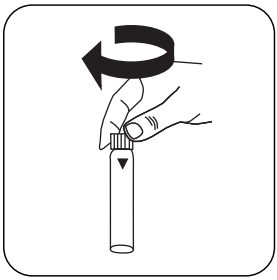
Zwei **Reagenzküvetten** bereitstellen. Eine als Nullküvette kennzeichnen.



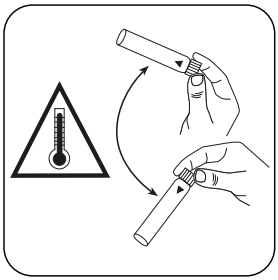
0.2 mL VE-Wasser in die Nullküvette geben.



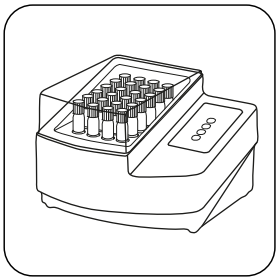
0.2 mL Probe in die Probenküvette geben.



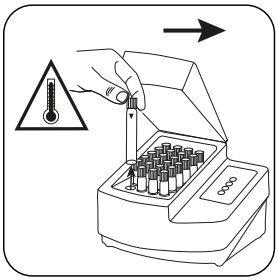
Küvette(n) verschließen.



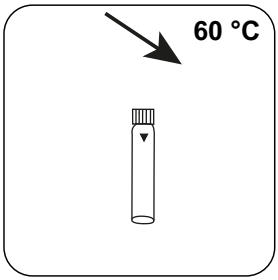
Inhalt durch vorsichtiges Umschwenken vermischen. **Achtung: Wärmeentwicklung!**



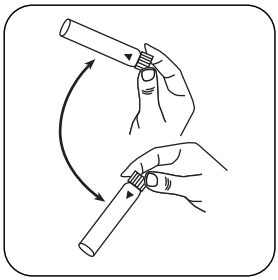
Küvette(n) in vorgeheiztem Thermoreaktor für **120 Minuten bei 150 °C** aufschließen.



Küvette aus dem Thermoreaktor nehmen. **(Achtung: Küvette ist heiß!)**

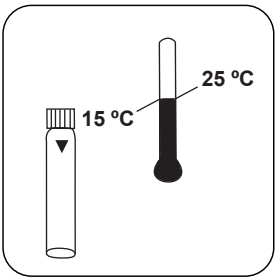


Küvette(n) auf etwa 60 °C abkühlen lassen.

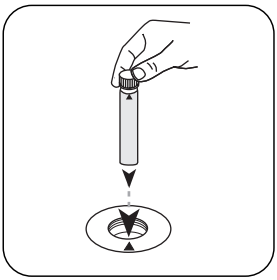


Inhalt durch Umschwenken mischen.

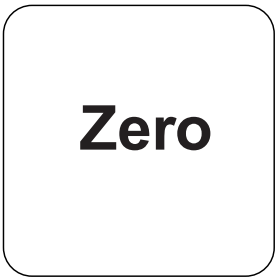
DE



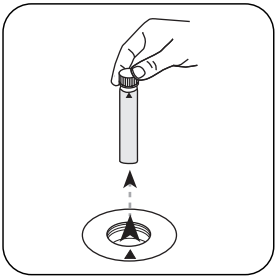
Die Küvette erst auf Raumtemperatur abkühlen lassen, dann vermessen.



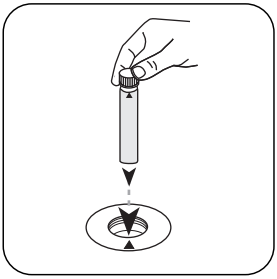
Die **Nullküvette** in den Messschacht stellen. Positionierung beachten.



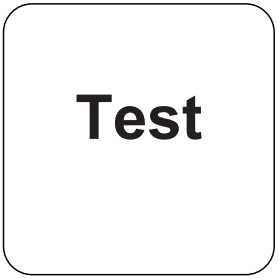
Taste **ZERO** drücken.



Die **Küvette** aus dem Messschacht nehmen.



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



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

In der Anzeige erscheint das Ergebnis in g/L CSB (XD: mg/L CSB).

Chemische Methode

Dichromate / H_2SO_4

Appendix

Störungen

Permanente Störungen

- In Ausnahmefällen können Inhaltsstoffe, für die das Oxidationsvermögen des Reagenzes nicht ausreicht, zu Minderbefunden führen.

Ausschließbare Störungen

- Um Fehlmessungen durch Schwebstoffe zu verhindern, ist es wichtig die Küvetten vorsichtig in den Messschacht einzusetzen, da sich methodenbedingt ein Niederschlag auf dem Boden der Küvetten bildet.
- Die Außenwände der Küvetten müssen sauber und trocken sein, bevor die Analyse durchgeführt wird. Fingerabdrücke oder Wassertropfen auf der Küvette führen zu Fehlmessungen.
- Bei der Standard Version stört Chlorid ab einer Konzentration von 10000 mg/L. Bei der quecksilberfreien Version hängt die Störung von der Chlorid-Konzentration und dem CSB ab. Konzentrationen ab 100 mg/L Chlorid können hier zu deutlichen Störungen führen. Zur Entfernung hoher Chlorid Konzentration in CSB-Proben, siehe Methode M130 CSB LR TT.

Methodenvalidierung

Nachweisgrenze	112.81 mg/L
Bestimmungsgrenze	338.43 mg/L
Messbereichsende	15 g/L
Empfindlichkeit	21,164 mg/L / Abs
Vertrauensbereich	70.48 mg/L
Verfahrensstandardabweichung	27.84 mg/L
Verfahrensvariationskoeffizient	0.37 %

Konform

ISO 15705:2002

Gemäß

ISO 15705:2002

[b] Reaktor erforderlich für CSB (150 °C), TOC (120 °C) und Gesamt -chrom, - phosphat, -stickstoff, (100 °C)

CSB LMR TT **M133**

15 - 300 mg/L COD[b)] **LMr**

Dichromate / H_2SO_4

DE

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
CSB LMR/25	25 St.	2423120
ValidCheck CSB 120 mg/L + TOC 48 mg/L	1 St.	48371425

Es wird außerdem folgendes Zubehör benötigt.

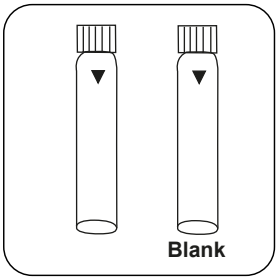
Zubehör	Verpackungseinheit	Bestell-Nr.
Thermoreaktor RD 125	1 St.	2418940

Anmerkungen

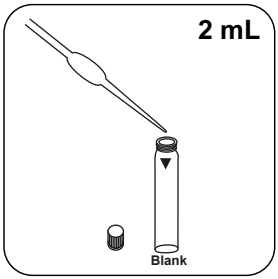
1. Die Nullküvette ist bei Lagerung im Dunkeln stabil. Nullküvette und Testküvette müssen aus demselben Batch sein.
2. Die Küvetten dürfen nicht heiß in den Küvettenschacht gestellt werden. Die stabilsten Messwerte werden ermittelt, wenn die Küvetten über Nacht stehen gelassen werden.

Durchführung der Bestimmung CSB LMR mit Küvettentest

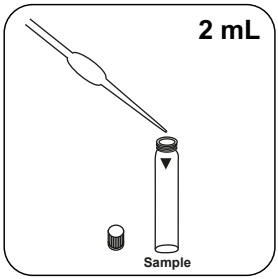
Die Methode im Gerät auswählen.



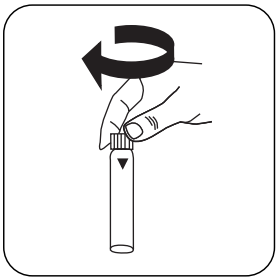
Zwei **Reagenzküvetten** bereitstellen. Eine als Nullküvette kennzeichnen.



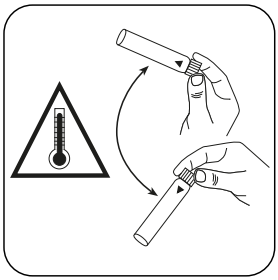
2 mL VE-Wasser in die Nullküvette geben.



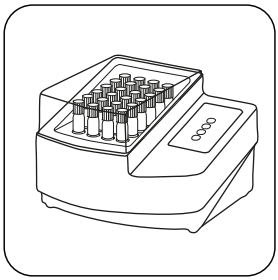
2 mL Probe in die Probenküvette geben.



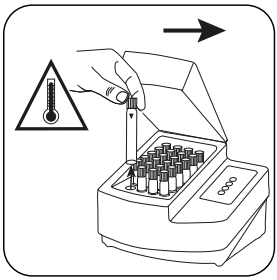
Küvette(n) verschließen.



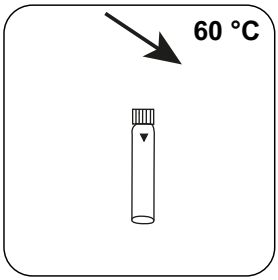
Inhalt durch vorsichtiges Umschwenken vermischen. **Achtung: Wärmeentwicklung!**



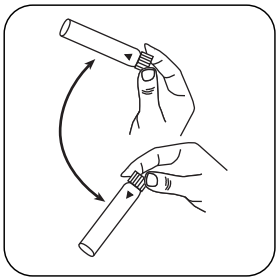
Küvette(n) in vorgeheiztem Thermoreaktor für **120 Minuten bei 150 °C** aufschließen.



Küvette aus dem Thermoreaktor nehmen. **(Achtung: Küvette ist heiß!)**

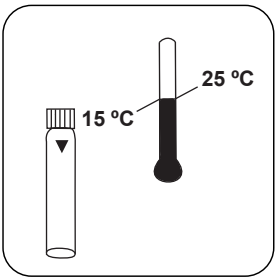


Küvette(n) auf etwa 60 °C abkühlen lassen.

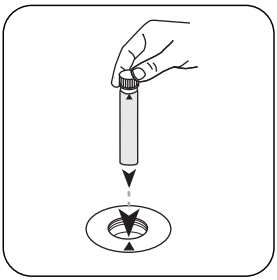


Inhalt durch Umschwenken mischen.

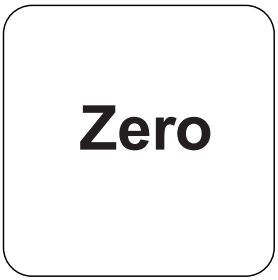
DE



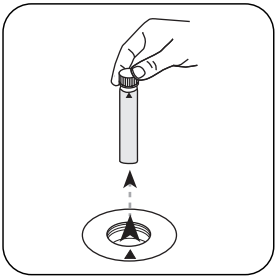
Die Küvette erst auf Raumtemperatur abkühlen lassen, dann vermessen.



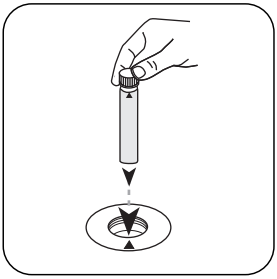
Die **Nullküvette** in den Messschacht stellen. Positionierung beachten.



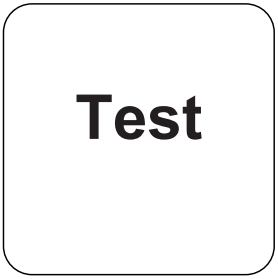
Taste **ZERO** drücken.



Die **Küvette** aus dem Messschacht nehmen.



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



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

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

Chemische Methode

Dichromate / H_2SO_4

Appendix

Störungen

Permanente Störungen

- In Ausnahmefällen können Inhaltsstoffe, für die das Oxidationsvermögen des Reagenzes nicht ausreicht, zu Minderbefunden führen.

Ausschließbare Störungen

- Um Fehlmessungen durch Schwebstoffe zu verhindern, ist es wichtig die Küvetten vorsichtig in den Messschacht einzusetzen, da sich methodenbedingt ein Niederschlag auf dem Boden der Küvetten bildet.
- Die Außenwände der Küvetten müssen sauber und trocken sein, bevor die Analyse durchgeführt wird. Fingerabdrücke oder Wassertropfen auf der Küvette führen zu Fehlmessungen.
- Bei der Standard Version stört Chlorid ab einer Konzentration von 1000 mg/L. Bei der quecksilberfreien Version hängt die Störung von der Chlorid-Konzentration und dem CSB ab. Konzentrationen ab 100 mg/L Chlorid können hier zu deutlichen Störungen führen. Zur Entfernung hoher Chlorid Konzentration in CSB-Proben, siehe Methode M130 CSB LR TT.

Methodenvalidierung

Nachweisgrenze	5.7 mg/L
Bestimmungsgrenze	17.2 mg/L
Messbereichsende	300 mg/L
Empfindlichkeit	-244 mg/L / Abs
Vertrauensbereich	2.56 mg/L
Verfahrensstandardabweichung	1.06 mg/L
Verfahrensvariationskoeffizient	0.67 %

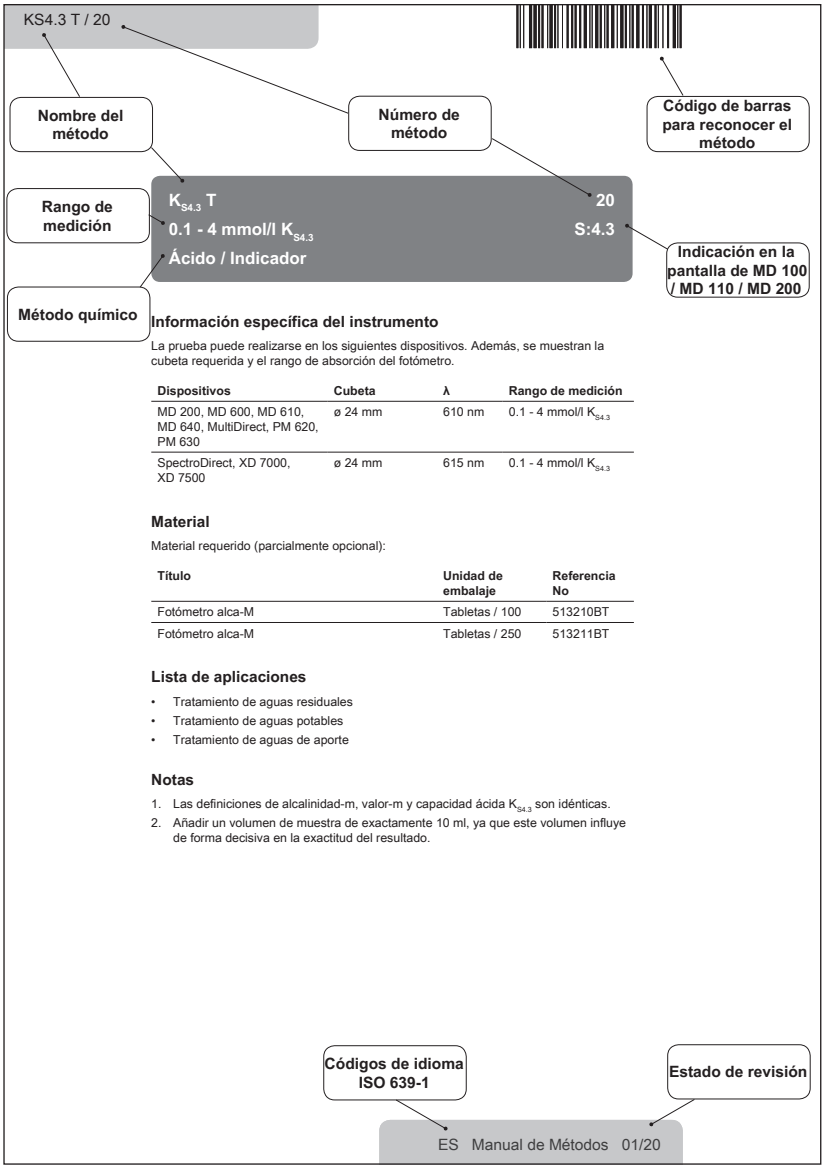
Konform

ISO 15705:2002

Gemäß

ISO 15705:2002
DIN 38409 Teil 41

[b] Reaktor erforderlich für CSB (150 °C), TOC (120 °C) und Gesamt -chrom, - phosphat, -stickstoff, (100 °C)


KS4.3 T / 20
Nombre del método
Número de método
Código de barras para reconocer el método
Rango de medición
$K_{S4.3}$ T
20
0.1 - 4 mmol/l $K_{S4.3}$
S:4.3
Ácido / Indicador
Indicación en la pantalla de MD 100 / MD 110 / MD 200
Método químico
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.
Códigos de idioma ISO 639-1
Estado de revisión
ES Manual de Métodos 01/20

Realización de la determinación

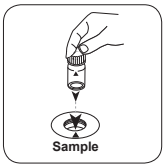
Ejecución de la determinación Capacidad ácida $K_{S4.3}$ con tableta

Seleccionar el método en el aparato.

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

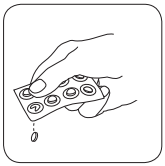
Llenar la cubeta de 24 mm con **10 ml de muestra** .

Cerrar la(s) cubeta(s).

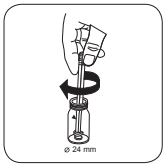


Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

• • •



Añadir **tableta ALKA-M-PHOTOMETER**.



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

Cerrar la(s) cubeta(s).

DQO LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DQO LR/25	25 Cantidad	2420720
CSB LR/25, sin mercurio	25 Cantidad	2420710
DQO LR/150	150 Cantidad	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 Cantidad	48371225
ValidCheck DQO 120 mg/l + TON NN mg/l	1 Cantidad	48371425
ValidCheck Multistandard efluentes en aguas residuales NH4-N/DQO/TOC/NO3-N/PO4-P/TP	1 Cantidad	48399612

Se requieren los siguientes accesorios.

Accesorios	Unidad de embalaje	No. de referencia
Termorreactor RD 125	1 Cantidad	2418940

Notas

1. La cubeta en blanco es estable si se deposita en un lugar oscuro.
2. La cubeta en blanco y la cubeta de muestra deben ser del mismo lote.
3. No introducir las cubetas calientes en el compartimiento de medición. Los mejores resultados se producirán dejando enfriar las cubetas durante la noche.

Eliminación de la alta concentración de cloruro en las muestras de DQO

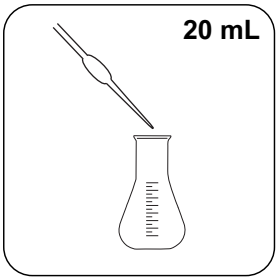
Si el contenido de cloruro excede la tolerancia de la prueba utilizada, pueden producirse interferencias durante la determinación de la DQO. Para evitar este problema, se debe realizar el siguiente pretratamiento de la muestra:**Accesorios:**

- 2 frascos Erlenmeyer de 300 mL con conexión NS 29/32
- 2 Absorbedor de HCl según DIN 38409
- 2 tapones de vidrio con NS 29/32
- Pipetas para 20 mL y 25 mL
- Agitadores magnéticos y barras agitadoras magnéticas
- Termómetro (rango de medición: 0 - 100 ° C)
- Baño de hielo

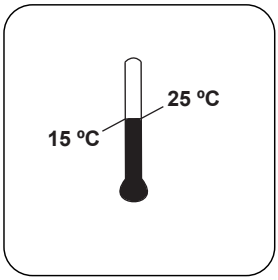
Reactivos:

- 12 - 14 g de cal sodada
- 50 mL de H_2SO_4 (95 - 97%, 1,84 g/ml, sin DQO)
- Ácido clorhídrico al 10%, para limpiar el absorbedor de residuos de cal

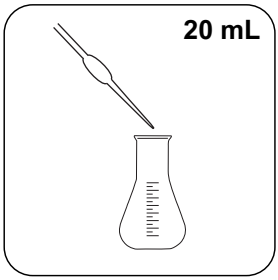
¡El trabajo debe realizarse bajo una campana de humos!



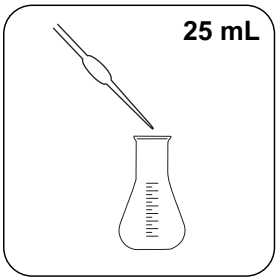
Añadir **20 mL de muestra** en el recipiente de muestra.



Dejar enfriar la muestra a **temperatura ambiente**.

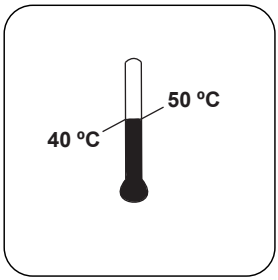


Añadir **20 mL de muestra** en el recipiente de muestra.



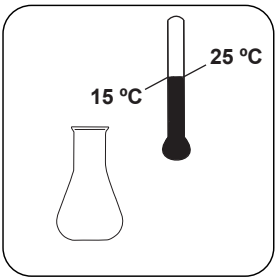
Añadir **25 mL de muestra** en el recipiente de muestra.

¡No mezclar el contenido!



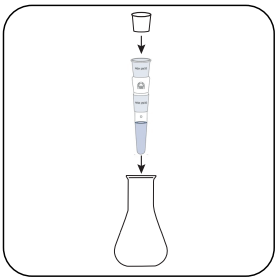
Dejar enfriar la muestra a **temperatura ambiente**.

ES

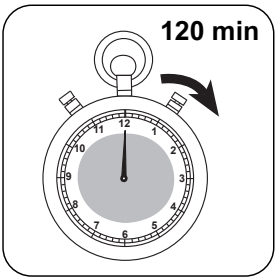


Dejar enfriar la(s) cubeta(s) a temperatura ambiente.

Añadir **6 - 7 g de polvos soda lime**.



Mezclar el contenido girando con cuidado.



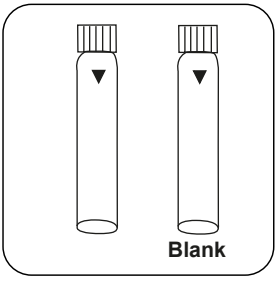
Calentar la muestra durante 120 minutos, o hasta que se haya disuelto totalmente.

Utilice esta muestra para el análisis de DQO. Este pretratamiento diluyó la muestra original por un factor de 2,05.

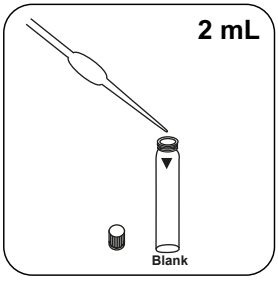
$_{\text{Muestra de}}\text{DQO} = {}_{\text{visualización de}}\text{DQO} \times 2{,}05$

Ejecución de la determinación CSB LR con prueba de cubetas Vario

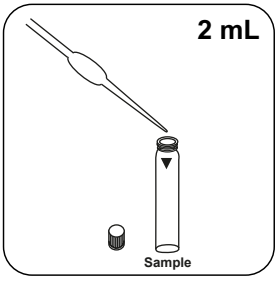
Seleccionar el método en el aparato.



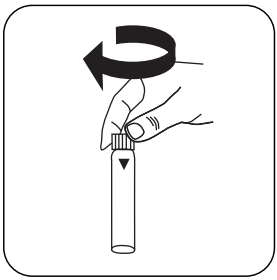
Preparar **dos cubetas reactivas**. Identificar una como cubeta en blanco.



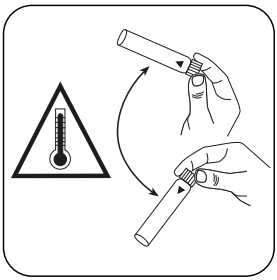
Añadir **2 mL de agua desionizada** en la cubeta en blanco.



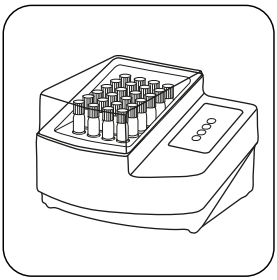
Añadir **2 mL de muestra** en la cubeta con la muestra.



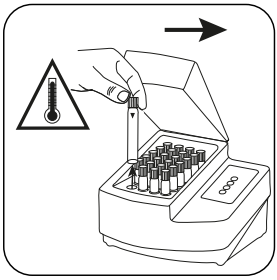
Cerrar la(s) cubeta(s).



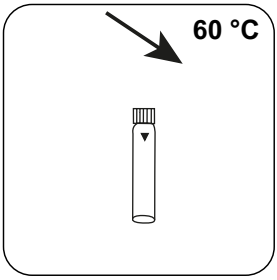
Mezclar el contenido girando con cuidado. **Atención: ¡Generación de calor!**



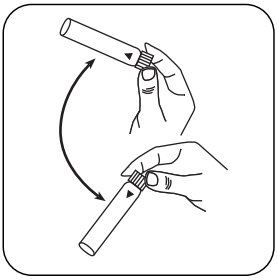
Disgregar la(s) cubeta(s) en el termoreactor precalentado durante **120 minutos a 150 °C** .



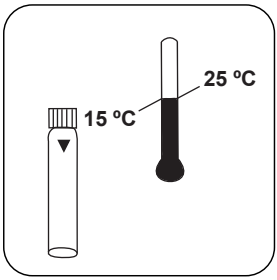
Extraer la cubeta del termoreactor. **(Atención: ¡La cubeta está caliente!)**



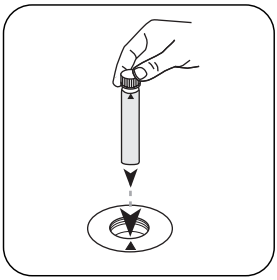
Dejar enfriar la(s) cubeta(s) a unos 60 °C.



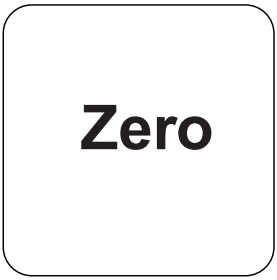
Mezclar el contenido girando.



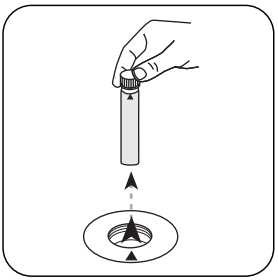
Dejar enfriar la cubeta a temperatura ambiente y después medir.



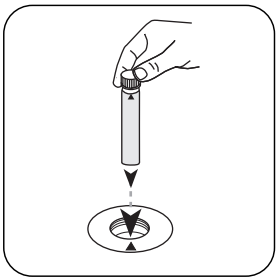
Poner la **cubeta en blanco** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



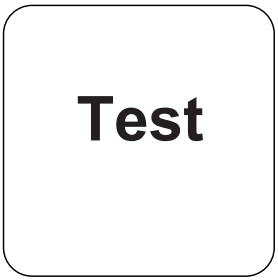
Pulsar la tecla **ZERO**.



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



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 DQO.

Método químico

Dichromate / H_2SO_4

Apéndice

Interferencia

Interferencias persistentes

- En casos excepcionales, los compuestos para los que la capacidad oxidativa del reactivo no sea suficiente, producen resultados erróneos.

Interferencias extraibles

- Para evitar mediciones incorrectas debido a las sustancias en suspensión, es importante colocar las cubetas con cuidado en el compartimiento de medición, ya que debido al método se produce una precipitación en el fondo de las cubetas.
- Antes de comenzar con la determinación, las caras exteriores de las cubetas deberán estar totalmente limpias y secas. Las huellas dactilares o la humedad en las superficies ópticas de la cubeta pueden producir mediciones erróneas.
- En la versión estándar, el cloruro interfiere a partir de una concentración de 1000 mg/L. En la versión sin mercurio, la perturbación depende de la concentración de cloruro y de la DQO. En este caso, concentraciones de cloruro de 100 mg/L pueden provocar alteraciones importantes.

Validación del método

Límite de detección	3.2 mg/L
Límite de determinación	9.7 mg/L
Límite del rango de medición	150 mg/L
Sensibilidad	-272 mg/L / Abs
Intervalo de confianza	3.74 mg/L
Desviación estándar	1.55 mg/L
Coeficiente de variación	2.02 %

Conforme a

ISO 15705:2002

De acuerdo a

ISO 15705:2002
DIN 38409 parte 41

[b] Necesario un reactor para DQO (150 °C), TOC (120 °C), cromo total, nitrógeno, fosfato (100 ° C)

DQO MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DQO MR/25	25 Cantidad	2420721
CSB MR/25, sin mercurio	25 Cantidad	2420711
DQO MR/150	150 Cantidad	2420726
CSB MR/150, sin mercurio	150 Cantidad	2420716
ValidCheck DQO 500 mg/l + TON NN mg/l	1 Cantidad	48371625
ValidCheck Multistandard afluentes en aguas residuales NH4-N/DQO/TOC/NO3-N/PO4-P/TP	1 Cantidad	48399712

Se requieren los siguientes accesorios.

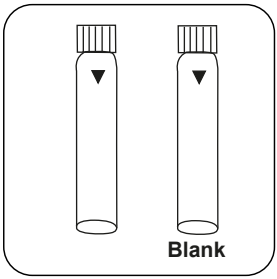
Accesorios	Unidad de embalaje	No. de referencia
Termorreactor RD 125	1 Cantidad	2418940

Notas

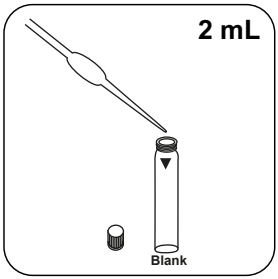
1. La cubeta en blanco es estable si se deposita en un lugar oscuro. La cubeta en blanco y la cubeta de muestra deben ser del mismo lote.
2. No introducir las cubetas calientes en el compartimiento de medición. Los mejores resultados se producirán dejando enfriar las cubetas durante la noche.
3. Para conseguir una mayor exactitud, se recomienda utilizar el set de cubetas CSB LR en las muestras con un CSB inferior a 100 mg/L.

Ejecución de la determinación CSB MR con prueba de cubetas Vario

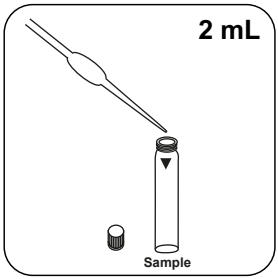
Seleccionar el método en el aparato.



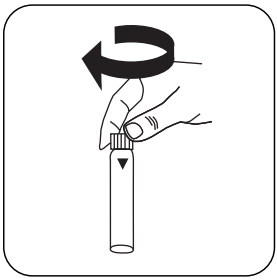
Preparar **dos cubetas reactivas**. Identificar una como cubeta en blanco.



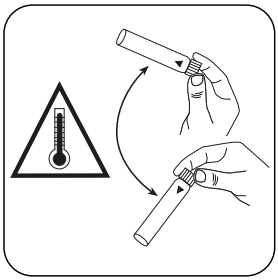
Añadir **2 mL de agua desionizada** en la cubeta en blanco.



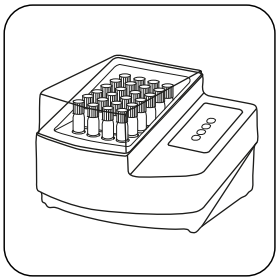
Añadir **2 mL de muestra** en la cubeta con la muestra.



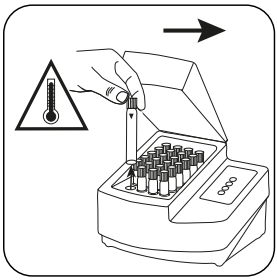
Cerrar la(s) cubeta(s).



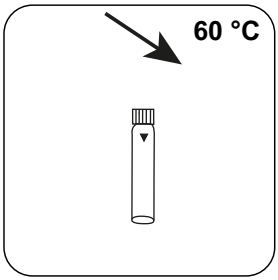
Mezclar el contenido girando con cuidado. **Atención: ¡Generación de calor!**



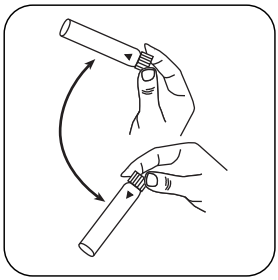
Disgregar la(s) cubeta(s) en el termoreactor precalentado durante **120 minutos a 150 °C** .



Extraer la cubeta del termoreactor. **(Atención: ¡La cubeta está caliente!)**

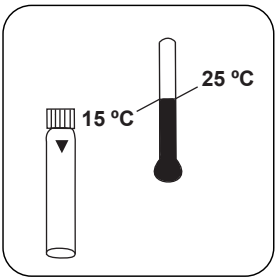


Dejar enfriar la(s) cubeta(s) a unos 60 °C.

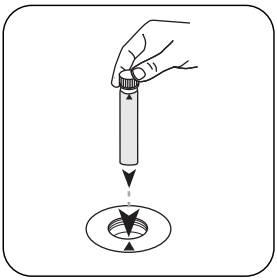


Mezclar el contenido girando.

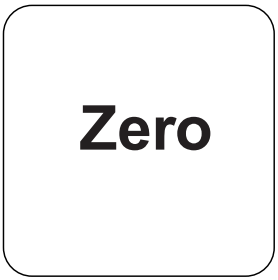
ES



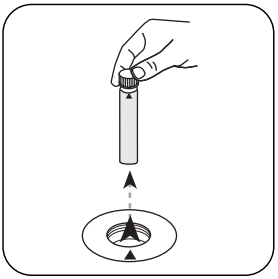
Dejar enfriar la cubeta a temperatura ambiente y después medir.



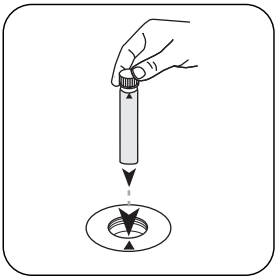
Poner la **cubeta en blanco** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



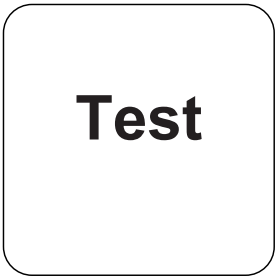
Pulsar la tecla **ZERO**.



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



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 DQO.

Método químico

Dichromate / H_2SO_4

Apéndice

Interferencia

Interferencias persistentes

- En casos excepcionales, los compuestos para los que la capacidad oxidativa del reactivo no sea suficiente, producen resultados erróneos.

Interferencias extraibles

- Para evitar mediciones incorrectas debido a las sustancias en suspensión, es importante colocar las cubetas con cuidado en el compartimiento de medición, ya que debido al método se produce una precipitación en el fondo de las cubetas.
- Antes de comenzar con la determinación, las caras exteriores de las cubetas deberán estar totalmente limpias y secas. Las huellas dactilares o la humedad en las superficies ópticas de la cubeta pueden producir mediciones erróneas.
- En la versión estándar, el cloruro interfiere a partir de una concentración de 1000 mg/L. En la versión sin mercurio, la perturbación depende de la concentración de cloruro y de la DQO. En este caso, concentraciones de cloruro de 100 mg/L pueden provocar alteraciones importantes. Para eliminar altas concentraciones de cloruro en muestras de DQO, consulte el método M130 DQO LR TT.

Validación del método

Límite de detección	8.66 mg/L
Límite de determinación	25.98 mg/L
Límite del rango de medición	1500 mg/L
Sensibilidad	2,141 mg/L / Abs
Intervalo de confianza	18.82 mg/L
Desviación estándar	7.78 mg/L
Coeficiente de variación	1.04 %

Conforme a

ISO 15705:2002

De acuerdo a

ISO 15705:2002
DIN 38409 parte 43

[b] Necesario un reactor para DQO (150 °C), TOC (120 °C), cromo total, nitrógeno, fosfato (100 ° C)

DQO HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DQO HR/25	25 Cantidad	2420722
CSB HR/25, sin mercurio	25 Cantidad	2420712
DQO HR/150	150 Cantidad	2420727
ValidCheck DQO 5000 mg/l + TON NN mg/l	1 Cantidad	48371825

Se requieren los siguientes accesorios.

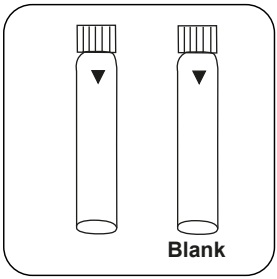
Accesorios	Unidad de embalaje	No. de referencia
Termorreactor RD 125	1 Cantidad	2418940
Pipeta 200 µl	1 Cantidad	365042
Pipeta automática, 1-5 ml	1 Cantidad	365032

Notas

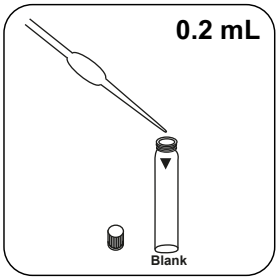
1. La cubeta en blanco es estable si se deposita en un lugar oscuro. La cubeta en blanco y la cubeta de muestra deben ser del mismo lote.
2. No introducir las cubetas calientes en el compartimiento de medición. Los mejores resultados se producirán dejando enfriar las cubetas durante la noche.
3. Para conseguir una mayor exactitud, se recomienda utilizar el set de cubetas CSB MR, para muestras con un CSB menor a 1 g/L o el el set de cubetas CSB LR en muestras con menos de 0,1 g/L.

Ejecución de la determinación CSB HR con prueba de cubetas Vario

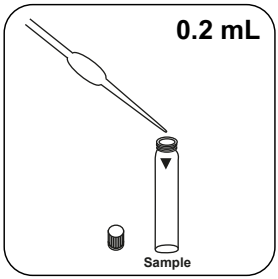
Seleccionar el método en el aparato.



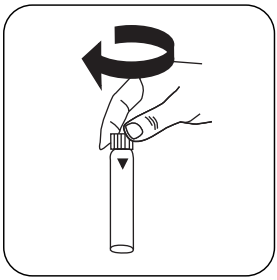
Preparar **dos cubetas reactivas**. Identificar una como cubeta en blanco.



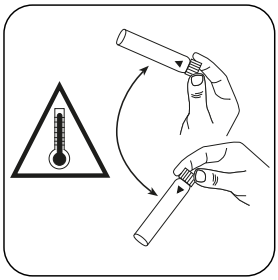
Añadir **0.2 mL de agua desionizada** en la cubeta en blanco.



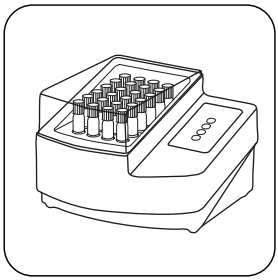
Añadir **0.2 mL de muestra** en la cubeta con la muestra.



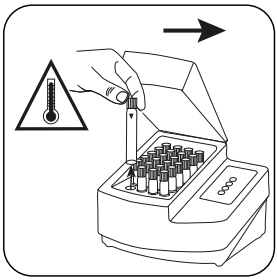
Cerrar la(s) cubeta(s).



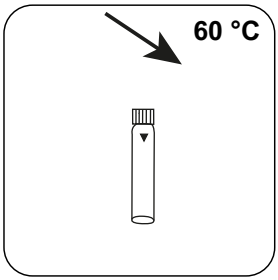
Mezclar el contenido girando con cuidado. **Atención: ¡Generación de calor!**



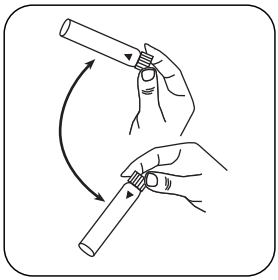
Disgregar la(s) cubeta(s) en el termoreactor precalentado durante **120 minutos a 150 °C** .



Extraer la cubeta del termoreactor. **(Atención: ¡La cubeta está caliente!)**

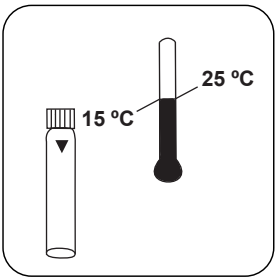


Dejar enfriar la(s) cubeta(s) a unos 60 °C.

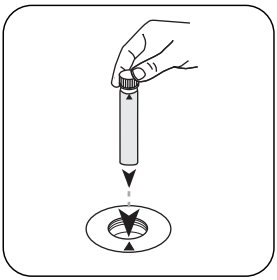


Mezclar el contenido girando.

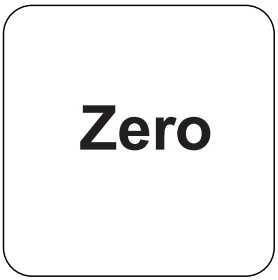
ES



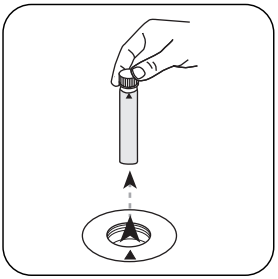
Dejar enfriar la cubeta a temperatura ambiente y después medir.



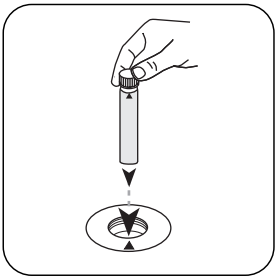
Poner la **cubeta en blanco** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



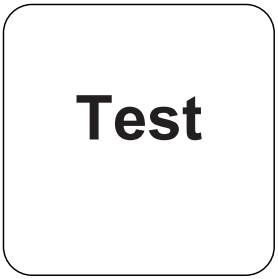
Pulsar la tecla **ZERO**.



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



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 g/L DQO (XD: mg/L DQO).

Método químico

Dichromate / H_2SO_4

Apéndice

Interferencia

Interferencias persistentes

- En casos excepcionales, los compuestos para los que la capacidad oxidativa del reactivo no sea suficiente, producen resultados erróneos.

Interferencias extraibles

- Para evitar mediciones incorrectas debido a las sustancias en suspensión, es importante colocar las cubetas con cuidado en el compartimiento de medición, ya que debido al método se produce una precipitación en el fondo de las cubetas.
- Antes de comenzar con la determinación, las caras exteriores de las cubetas deberán estar totalmente limpias y secas. Las huellas dactilares o la humedad en las superficies ópticas de la cubeta pueden producir mediciones erróneas.
- En la versión estándar, el cloruro interfiere a partir de una concentración de 10000 mg/L. En la versión sin mercurio, la perturbación depende de la concentración de cloruro y de la DQO. En este caso, concentraciones de cloruro de 100 mg/L pueden provocar alteraciones importantes. Para eliminar altas concentraciones de cloruro en muestras de DQO, consulte el método M130 DQO LR TT.

Validación del método

Límite de detección	112.81 mg/L
Límite de determinación	338.43 mg/L
Límite del rango de medición	15 g/L
Sensibilidad	21,164 mg/L / Abs
Intervalo de confianza	70.48 mg/L
Desviación estándar	27.84 mg/L
Coeficiente de variación	0.37 %

Conforme a

ISO 15705:2002

De acuerdo a

ISO 15705:2002

[b] Necesario un reactor para DQO (150 °C), TOC (120 °C), cromo total, nitrógeno, fosfato (100 ° C)

DQO LMR TT M133

15 - 300 mg/L COD[b)] LMr

Dichromate / H_2SO_4

ES

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
DQO LMR/25	25 Cantidad	2423120
ValidCheck DQO 120 mg/l + TON NN mg/l	1 Cantidad	48371425

Se requieren los siguientes accesorios.

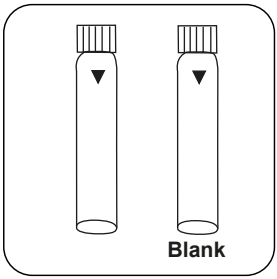
Accesorios	Unidad de embalaje	No. de referencia
Termorreactor RD 125	1 Cantidad	2418940

Notas

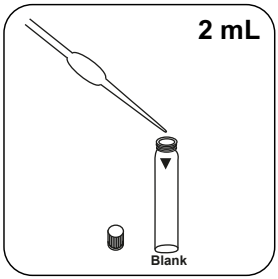
1. La cubeta en blanco es estable si se deposita en un lugar oscuro. La cubeta en blanco y la cubeta de muestra deben ser del mismo lote.
2. No introducir las cubetas calientes en el compartimiento de medición. Los mejores resultados se producirán dejando enfriar las cubetas durante la noche.

Ejecución de la determinación DQO LMR con tube test

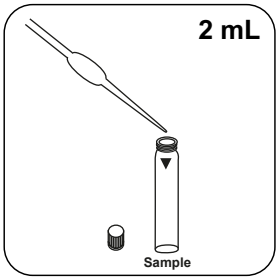
Seleccionar el método en el aparato.



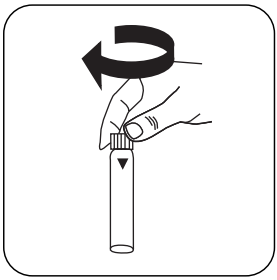
Preparar **dos cubetas reactivas**. Identificar una como cubeta en blanco.



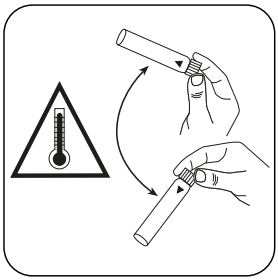
Añadir **2 mL de agua desionizada** en la cubeta en blanco.



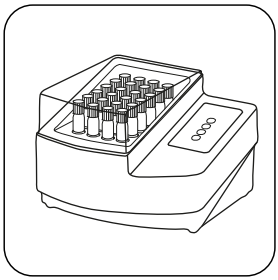
Añadir **2 mL de muestra** en la cubeta con la muestra.



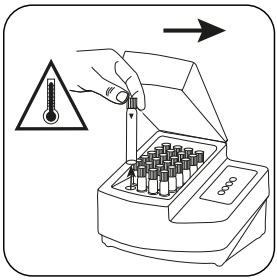
Cerrar la(s) cubeta(s).



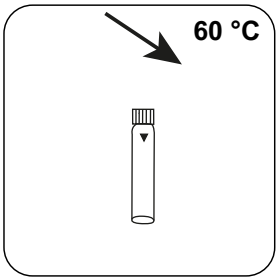
Mezclar el contenido girando con cuidado. **Atención: ¡Generación de calor!**



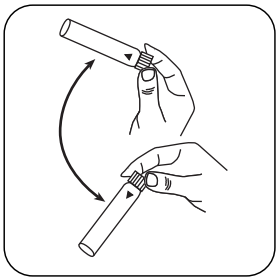
Disgregar la(s) cubeta(s) en el termoreactor precalentado durante **120 minutos a 150 °C** .



Extraer la cubeta del termoreactor. **(Atención: ¡La cubeta está caliente!)**

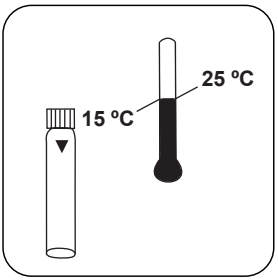


Dejar enfriar la(s) cubeta(s) a unos 60 °C.

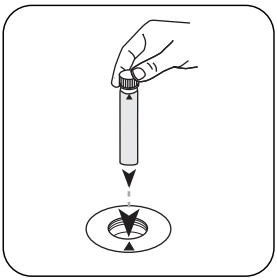


Mezclar el contenido girando.

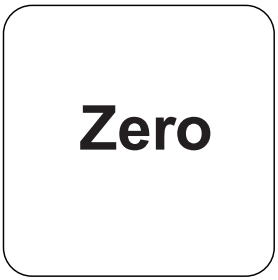
ES



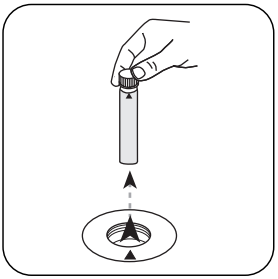
Dejar enfriar la cubeta a temperatura ambiente y después medir.



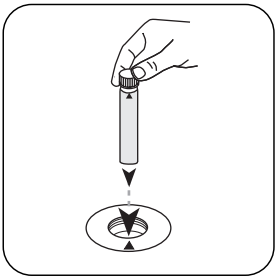
Poner la **cubeta en blanco** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!



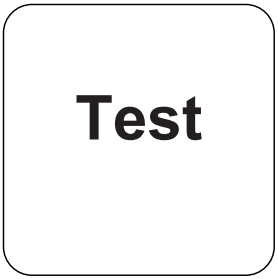
Pulsar la tecla **ZERO**.



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



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 DQO.

Método químico

Dichromate / H_2SO_4

Apéndice

Interferencia

Interferencias persistentes

- En casos excepcionales, los compuestos para los que la capacidad oxidativa del reactivo no sea suficiente, producen resultados erróneos.

Interferencias extraibles

- Para evitar mediciones incorrectas debido a las sustancias en suspensión, es importante colocar las cubetas con cuidado en el compartimiento de medición, ya que debido al método se produce una precipitación en el fondo de las cubetas.
- Antes de comenzar con la determinación, las caras exteriores de las cubetas deberán estar totalmente limpias y secas. Las huellas dactilares o la humedad en las superficies ópticas de la cubeta pueden producir mediciones erróneas.
- En la versión estándar, el cloruro interfiere a partir de una concentración de 1000 mg/L. En la versión sin mercurio, la perturbación depende de la concentración de cloruro y de la DQO. En este caso, concentraciones de cloruro de 100 mg/L pueden provocar alteraciones importantes. Para eliminar altas concentraciones de cloruro en muestras de DQO, consulte el método M130 DQO LR TT.

Validación del método

Límite de detección	5.7 mg/L
Límite de determinación	17.2 mg/L
Límite del rango de medición	300 mg/L
Sensibilidad	-244 mg/L / Abs
Intervalo de confianza	2.56 mg/L
Desviación estándar	1.06 mg/L
Coeficiente de variación	0.67 %

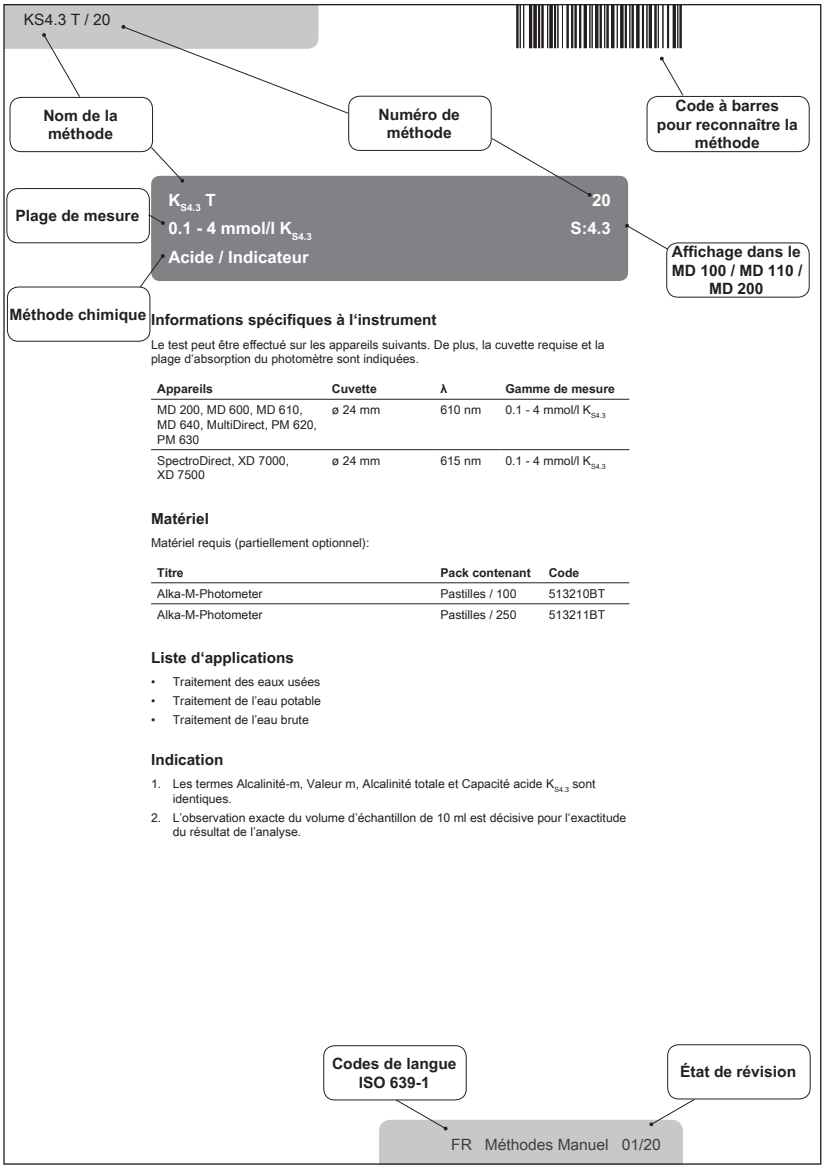
Conforme a

ISO 15705:2002

De acuerdo a

ISO 15705:2002
DIN 38409 parte 41

[b] Necesario un reactor para DQO (150 °C), TOC (120 °C), cromo total, nitrógeno, fosfato (100 ° C)



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

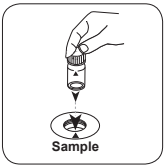
Réalisation de la quantification Capacité acide $K_{S4.3}$ avec pastille

Sélectionnez la méthode sur l'appareil.

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

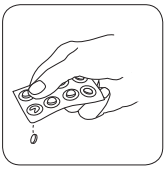
Remplissez une cuvette de 24 mm de **10 ml d'échantillon**.

Fermez la(les) cuvette(s).

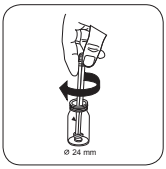


Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.

• • •



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



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

Fermez la(les) cuvette(s).

DCO LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

FR

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
DCO LR/25	25 Pièces	2420720
CSB LR/25, sans mercure	25 Pièces	2420710
DCO LR/150	150 Pièces	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 Pièces	48371225
ValidChek COD 120 mg/l + TON NN mg/l	1 Pièces	48371425
ValidCheck Multiétalon effluents eau usée NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 Pièces	48399612

Les accessoires suivants sont requis.

Accessoires	Pack contenant	Code
Thermoréacteur RD 125	1 Pièces	2418940

Indication

1. Conservée dans un endroit sombre, la cuvette du blanc reste stable.
2. La cuvette du blanc et la cuvette test doivent être du même lot.
3. Ne pas déposer les cuvettes à l'état très chaud dans le porte-cuvettes. Les mesures les plus stables sont obtenues en laissant les cuvettes reposer pendant toute une nuit.

Élimination des fortes concentrations de chlorure dans les échantillons de DCO

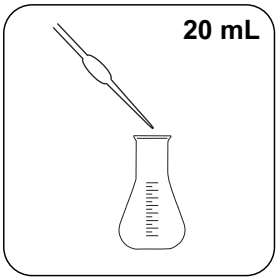
Si la teneur en chlorure dépasse la tolérance du test utilisé, des interférences peuvent se produire lors de la détermination de la DCO. Pour éviter ce problème, il convient de procéder au prétraitement de l'échantillon suivant :**Accessoires :**

- 2 flacons Erlenmeyer de 300 mL avec raccord NS 29/32
- 2 Absorbeur de HCl selon la norme DIN 38409
- 2 bouchons en verre avec NS 29/32
- Pipettes pour 20 mL et 25 mL
- Agitateurs magnétiques et barres d'agitation magnétiques
- Thermomètre (plage de mesure : 0 - 100 ° C)
- Bain de glace

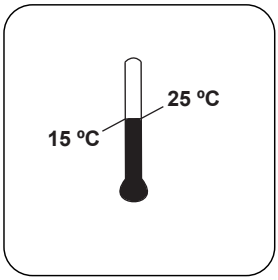
Réactifs :

- 12 - 14 g de chaux sodée
- 50 mL de H_2SO_4 (95 - 97%, 1,84 g/ml, sans DCO)
- Acide chlorhydrique à 10%, pour nettoyer l'absorbeur des résidus de chaux

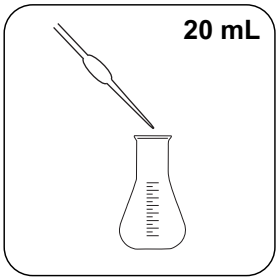
Le travail doit être effectué sous une hotte !



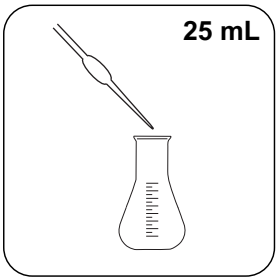
Versez **20 mL d'échantillon** dans le tube de fractionnement.



Laissez refroidir l'échantillon à **température ambiante**.

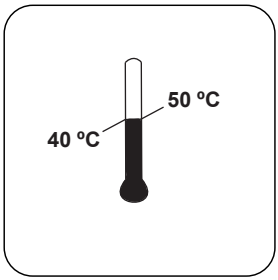


Versez **20 mL d'échantillon** dans le tube de fractionnement.



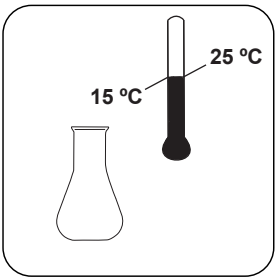
Versez **25 mL d'échantillon** dans le tube de fractionnement.

Ne pas mélanger le contenu !



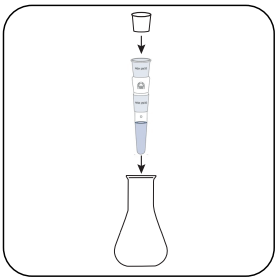
Laissez refroidir l'échantillon à **température ambiante**.

FR

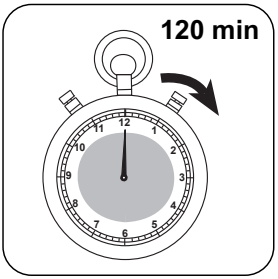


Laissez la(les) cuvette(s) refroidir à température ambiante.

Ajoutez **6 - 7 g de poudre de soda lime**.



Mélangez soigneusement le contenu en mettant prudemment le tube à l'envers puis à l'endroit.



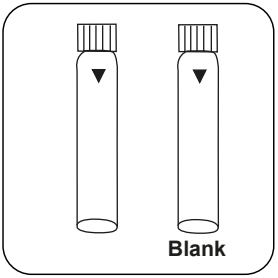
Réchauffez l'échantillon pendant **120 minutes,** ou jusqu'à ce que tout soit entièrement dissous.

Utilisez cet échantillon pour l'analyse de la DCO. Ce prétraitement a dilué l'échantillon original par un facteur de 2,05.

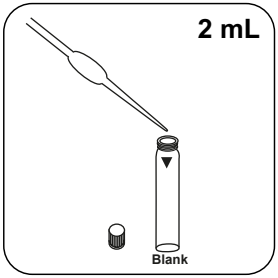
$_{\text{Échantillon}}$ DCO = $_{\text{affichage}}$ DCO x 2,05

Réalisation de la quantification DCO LR avec test à cuve Vario

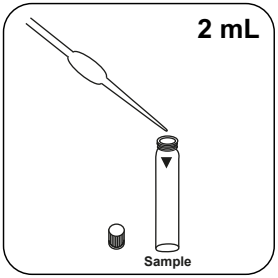
Sélectionnez la méthode sur l'appareil.



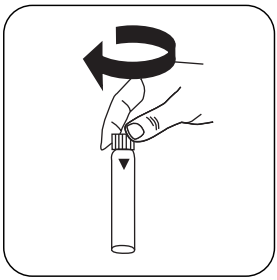
Préparez deux **cuvettes de réactif** . L'une des deux cuvettes sera la cuvette du blanc. Étiquetez-la.



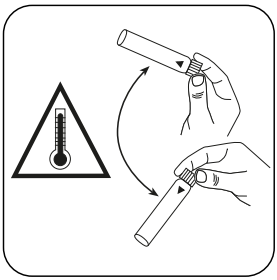
Versez **2 mL d'eau déminéralisée** dans la cuvette du blanc.



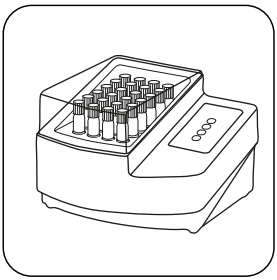
Versez **2 mL d'échantillon** dans la cuvette réservée à l'échantillon.



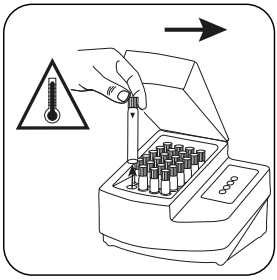
Fermez la(les) cuvette(s).



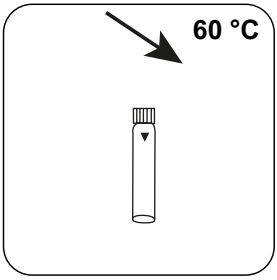
Mélangez soigneusement le contenu en mettant prudemment le tube à l'envers puis à l'endroit. **Attention : Développement de chaleur !**



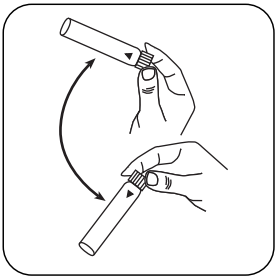
Fractionnez la(les) cuvette(s) dans un thermoréacteur préchauffé pendant **120 minutes à 150 °C** .



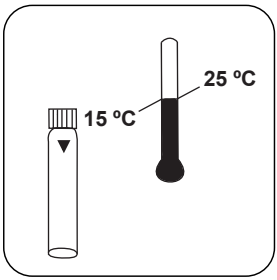
Retirez la cuvette du thermoréacteur. **(Attention : la cuvette est très chaude !)**



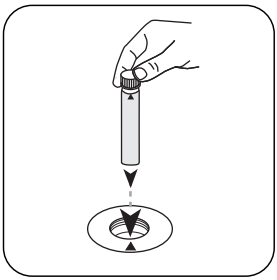
Laissez la(les) cuvette(s) refroidir à env. 60 °C.



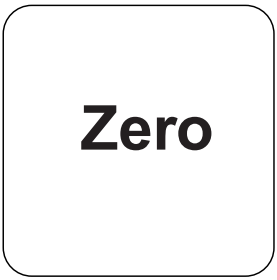
Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.



Laissez d'abord refroidir la cuvette à température ambiante puis effectuez les mesures.



Placez la **cuvette du blanc** dans la chambre de mesure. Attention à la positionner correctement.



Appuyez sur la touche **ZERO**.

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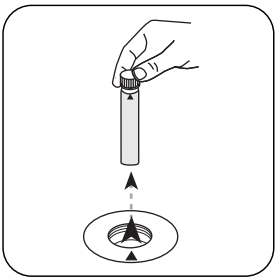
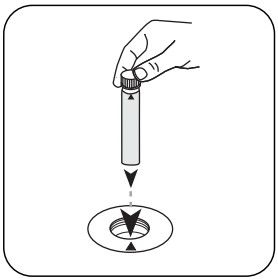
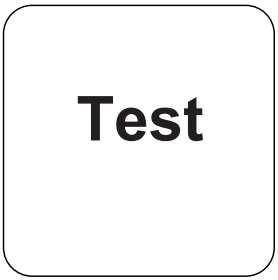


Retirez la **cuvette** de la chambre de mesure.



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 DCO.

Méthode chimique

Dichromate / H_2SO_4

Appendice

Interférences

Interférences persistantes

- Exceptionnellement, les constituants pour lesquels la capacité oxydante du réactif ne suffit pas, peuvent entraîner une baisse des résultats.

Interférences exclues

- Pour empêcher les erreurs de mesure par des éléments en suspension, il est important de placer soigneusement les cuvettes dans la chambre de mesure. En effet, la méthode cause la formation d'un précipité sur le fond des cuvettes.
- Les parois extérieures des cuvettes doivent être sèches et propres avant de procéder à l'analyse. La présence de traces de doigt ou de gouttes d'eau sur la cuvette entraînent des mesures erronées.
- Dans la version standard, le chlorure interfère à partir d'une concentration de 1000 mg/L. Dans la version sans mercure, la perturbation dépend de la concentration de chlorure et de la DCO. Des concentrations à partir de 100 mg/L de chlorure peuvent ici entraîner des perturbations importantes.

Méthode Validation

Limite de détection	3.2 mg/L
Limite de détermination	9.7 mg/L
Fin de la gamme de mesure	150 mg/L
Sensibilité	-272 mg/L / Abs
Intervalle de confiance	3.74 mg/L
Déviation standard	1.55 mg/L
Coefficient de variation	2.02 %

Conformité

ISO 15705:2002

Selon

ISO 15705:2002
DIN 38409 partie 41

[b]Réacteur nécessaire pour DCO (150 °C), COT (120 °C), chrome total, phosphate total, azote total, (100 °C)

DCO MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

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Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
DCO MR/25	25 Pièces	2420721
CSB MR/25, sans mercure	25 Pièces	2420711
DCO MR/150	150 Pièces	2420726
CSB MR/150, sans mercure	150 Pièces	2420716
ValidChek COD 500 mg/l + TON NN mg/l	1 Pièces	48371625
ValidCheck Multiétalon influents eau usée NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 Pièces	48399712

Les accessoires suivants sont requis.

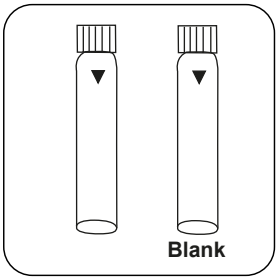
Accessoires	Pack contenant	Code
Thermoréacteur RD 125	1 Pièces	2418940

Indication

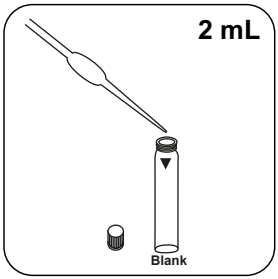
1. Conservée dans un endroit sombre, la cuvette du blanc reste stable. La cuvette du blanc et la cuvette test doivent être du même lot.
2. Ne pas déposer les cuvettes à l'état très chaud dans le porte-cuvettes. Les mesures les plus stables sont obtenues en laissant les cuvettes reposer pendant toute une nuit.
3. Pour les échantillons d'un CSB (ou DCO en français) inférieur à 100 mg/L, il est recommandé d'utiliser le lot de cuvettes CSB LR qui permettra d'obtenir un niveau d'exactitude supérieur.

Réalisation de la quantification DCO MR avec test à cuve Vario

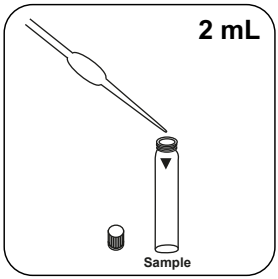
Sélectionnez la méthode sur l'appareil.



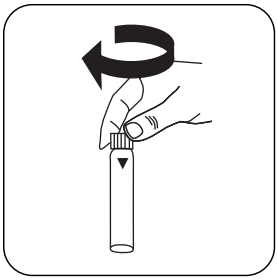
Préparez deux **cuvettes de réactif** . L'une des deux cuvettes sera la cuvette du blanc. Étiquetez-la.



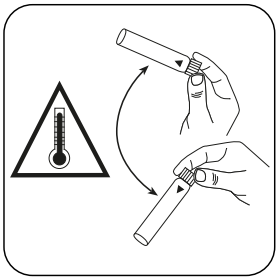
Versez **2 mL d'eau déminéralisée** dans la cuvette du blanc.



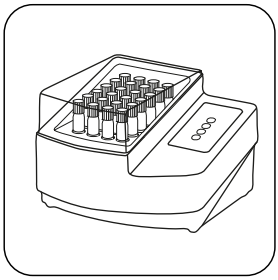
Versez **2 mL d'échantillon** dans la cuvette réservée à l'échantillon.



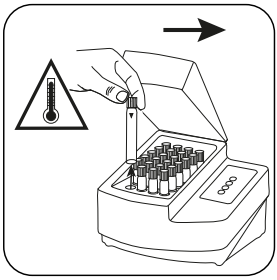
Fermez la(les) cuvette(s).



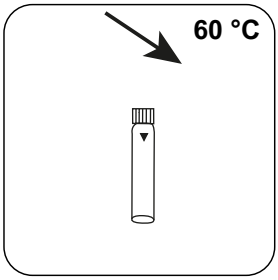
Mélangez soigneusement le contenu en mettant prudemment le tube à l'envers puis à l'endroit. **Attention : Développement de chaleur !**



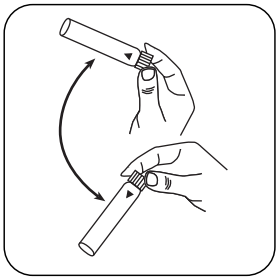
Fractionnez la(les) cuvette(s) dans un thermoréacteur préchauffé pendant **120 minutes à 150 °C** .



Retirez la cuvette du thermoréacteur. **(Attention : la cuvette est très chaude !)**



Laissez la(les) cuvette(s) refroidir à env. 60 °C.



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

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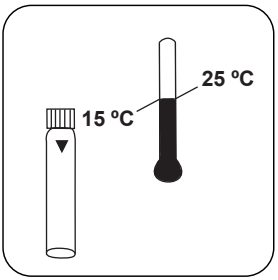
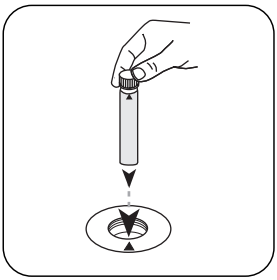
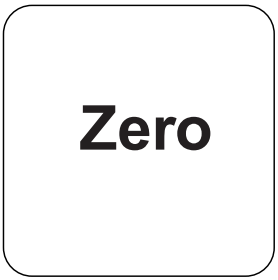


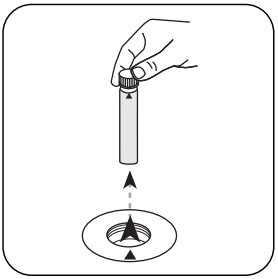
Laissez d'abord refroidir la cuvette à température ambiante puis effectuez les mesures.



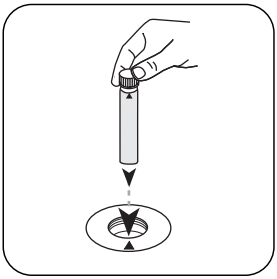
Placez la **cuvette du blanc** dans la chambre de mesure. Attention à la positionner correctement.



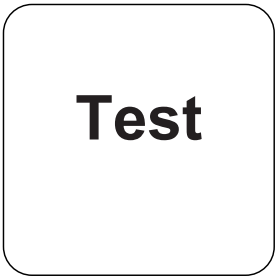
Appuyez sur la touche **ZERO**.



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



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 DCO.

Méthode chimique

Dichromate / H_2SO_4

Appendice

Interférences

Interférences persistantes

- Exceptionnellement, les constituants pour lesquels la capacité oxydante du réactif ne suffit pas, peuvent entraîner une baisse des résultats.

Interférences exclues

- Pour empêcher les erreurs de mesure par des éléments en suspension, il est important de placer soigneusement les cuvettes dans la chambre de mesure. En effet, la méthode cause la formation d'un précipité sur le fond des cuvettes.
- Les parois extérieures des cuvettes doivent être sèches et propres avant de procéder à l'analyse. La présence de traces de doigt ou de gouttes d'eau sur la cuvette entraînent des mesures erronées.
- Dans la version standard, le chlorure interfère à partir d'une concentration de 1000 mg/L. Dans la version sans mercure, la perturbation dépend de la concentration de chlorure et de la DCO. Des concentrations à partir de 100 mg/L de chlorure peuvent ici entraîner des perturbations importantes. Pour éliminer les concentrations élevées de chlorure dans les échantillons DCO, voir la méthode M130 COD LR TT.

Méthode Validation

Limite de détection	8.66 mg/L
Limite de détermination	25.98 mg/L
Fin de la gamme de mesure	1500 mg/L
Sensibilité	2,141 mg/L / Abs
Intervalle de confiance	18.82 mg/L
Déviation standard	7.78 mg/L
Coefficient de variation	1.04 %

Conformité

ISO 15705:2002

Selon

ISO 15705:2002
DIN 38409 partie 43

[b]Réacteur nécessaire pour DCO (150 °C), COT (120 °C), chrome total, phosphate total, azote total, (100 °C)

DCO HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

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Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
DCO HR/25	25 Pièces	2420722
CSB HR/25, sans mercure	25 Pièces	2420712
DCO HR/150	150 Pièces	2420727
ValidChek COD 5000 mg/l + TON NN mg/l	1 Pièces	48371825

Les accessoires suivants sont requis.

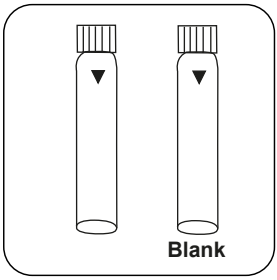
Accessoires	Pack contenant	Code
Thermoréacteur RD 125	1 Pièces	2418940
Pipette 200 µl	1 Pièces	365042
Pipette automatique, 1-5 ml	1 Pièces	365032

Indication

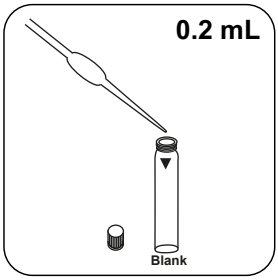
1. Conservée dans un endroit sombre, la cuvette du blanc reste stable. La cuvette du blanc et la cuvette test doivent être du même lot.
2. Ne pas déposer les cuvettes à l'état très chaud dans le porte-cuvettes. Les mesures les plus stables sont obtenues en laissant les cuvettes reposer pendant toute une nuit.
3. Pour les échantillons d'un CSB (ou DCO en français) inférieur à 1 g/L, il est recommandé d'utiliser le lot de cuvettes CSB MR, pour les échantillons de moins d'0,1 g/L, le lot de cuvettes CSB LR qui permettra d'obtenir un niveau d'exactitude supérieur.

Réalisation de la quantification DCO HR avec test à cuve Vario

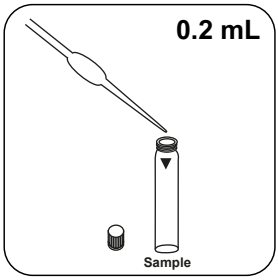
Sélectionnez la méthode sur l'appareil.



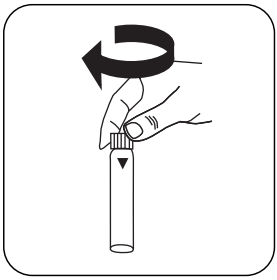
Préparez deux **cuvettes de réactif** . L'une des deux cuvettes sera la cuvette du blanc. Étiquetez-la.



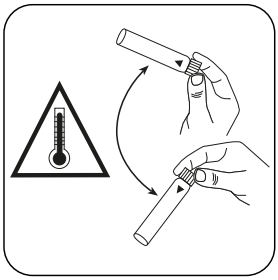
Versez **0.2 mL d'eau déminéralisée** dans la cuvette du blanc.



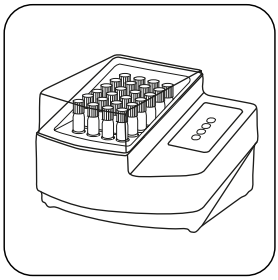
Versez **0.2 mL d'échantillon** dans la cuvette réservée à l'échantillon.



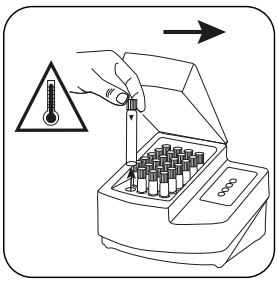
Fermez la(les) cuvette(s).



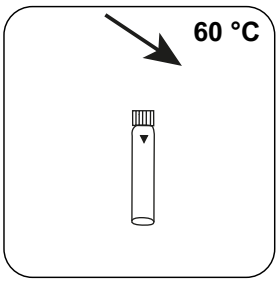
Mélangez soigneusement le contenu en mettant prudemment le tube à l'envers puis à l'endroit. **Attention : Développement de chaleur !**



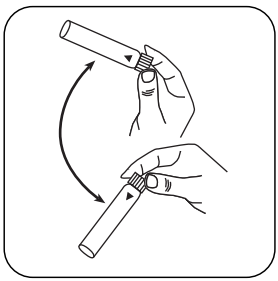
Fractionnez la(les) cuvette(s) dans un thermoréacteur préchauffé pendant **120 minutes à 150 °C** .



Retirez la cuvette du thermoréacteur. **(Attention : la cuvette est très chaude !)**

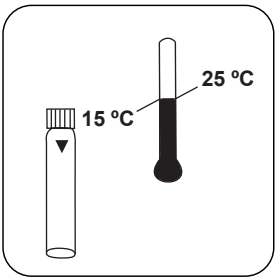


Laissez la(les) cuvette(s) refroidir à env. 60 °C.

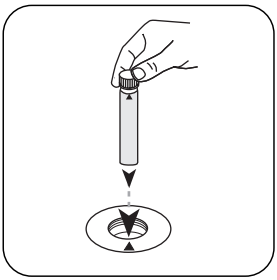


Mélangez le contenu en mettant le tube plusieurs fois à l'envers puis à l'endroit.

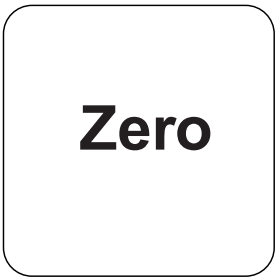
FR



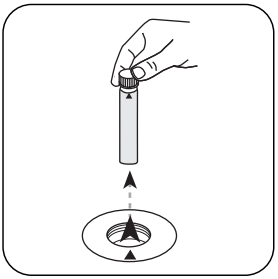
Laissez d'abord refroidir la cuvette à température ambiante puis effectuez les mesures.



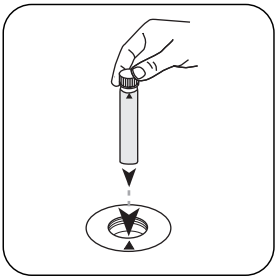
Placez la **cuvette du blanc** dans la chambre de mesure. Attention à la positionner correctement.



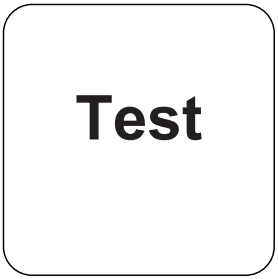
Appuyez sur la touche **ZERO**.



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



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 g/L DCO (XD: mg/L DCO).

Méthode chimique

Dichromate / H_2SO_4

Appendice

Interférences

Interférences persistantes

- Exceptionnellement, les constituants pour lesquels la capacité oxydante du réactif ne suffit pas, peuvent entraîner une baisse des résultats.

Interférences exclues

- Pour empêcher les erreurs de mesure par des éléments en suspension, il est important de placer soigneusement les cuvettes dans la chambre de mesure. En effet, la méthode cause la formation d'un précipité sur le fond des cuvettes.
- Les parois extérieures des cuvettes doivent être sèches et propres avant de procéder à l'analyse. La présence de traces de doigt ou de gouttes d'eau sur la cuvette entraînent des mesures erronées.
- Dans la version standard, le chlorure interfère à partir d'une concentration de 10000 mg/L. Dans la version sans mercure, la perturbation dépend de la concentration de chlorure et de la DCO. Des concentrations à partir de 100 mg/L de chlorure peuvent ici entraîner des perturbations importantes. Pour éliminer les concentrations élevées de chlorure dans les échantillons DCO, voir la méthode M130 COD LR TT.

Méthode Validation

Limite de détection	112.81 mg/L
Limite de détermination	338.43 mg/L
Fin de la gamme de mesure	15 g/L
Sensibilité	21,164 mg/L / Abs
Intervalle de confiance	70.48 mg/L
Déviation standard	27.84 mg/L
Coefficient de variation	0.37 %

Conformité

ISO 15705:2002

Selon

ISO 15705:2002

[b]Réacteur nécessaire pour DCO (150 °C), COT (120 °C), chrome total, phosphate total, azote total, (100 °C)

DCO LMR TT M133

15 - 300 mg/L COD[b] LMr

Dichromate / H_2SO_4

FR

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
DCO LMR/25	25 Pièces	2423120
ValidChek COD 120 mg/l + TON NN mg/l	1 Pièces	48371425

Les accessoires suivants sont requis.

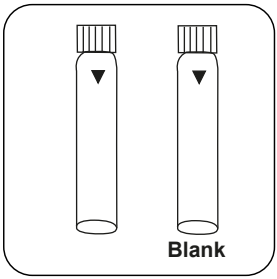
Accessoires	Pack contenant	Code
Thermoréacteur RD 125	1 Pièces	2418940

Indication

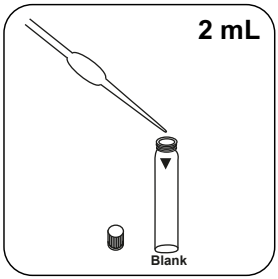
1. Conservée dans un endroit sombre, la cuvette du blanc reste stable. La cuvette du blanc et la cuvette test doivent être du même lot.
2. Ne pas déposer les cuvettes à l'état très chaud dans le porte-cuvettes. Les mesures les plus stables sont obtenues en laissant les cuvettes reposer pendant toute une nuit.

Réalisation de la quantification DOC LMR avec tube à essai

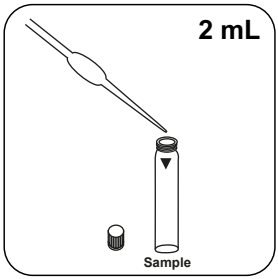
Sélectionnez la méthode sur l'appareil.



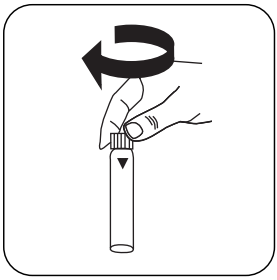
Préparez deux **cuvettes de réactif** . L'une des deux cuvettes sera la cuvette du blanc. Étiquetez-la.



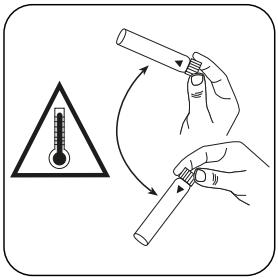
Versez **2 mL d'eau déminéralisée** dans la cuvette du blanc.



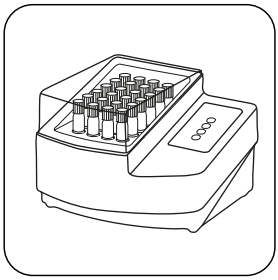
Versez **2 mL d'échantillon** dans la cuvette réservée à l'échantillon.



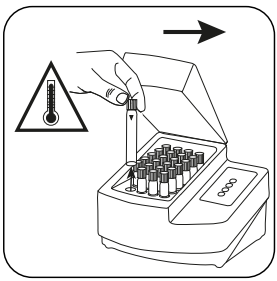
Fermez la(les) cuvette(s).



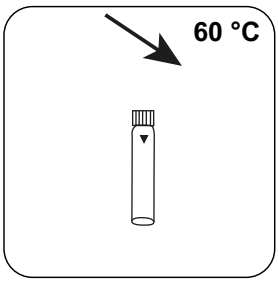
Mélangez soigneusement le contenu en mettant prudemment le tube à l'envers puis à l'endroit. **Attention : Développement de chaleur !**



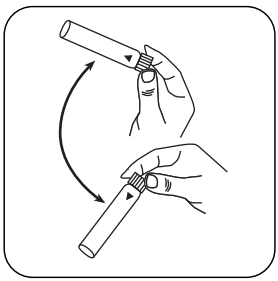
Fractionnez la(les) cuvette(s) dans un thermoréacteur préchauffé pendant **120 minutes à 150 °C** .



Retirez la cuvette du thermoréacteur. **(Attention : la cuvette est très chaude !)**



Laissez la(les) cuvette(s) refroidir à env. 60 °C.



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

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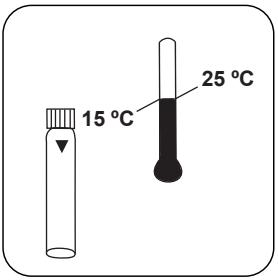
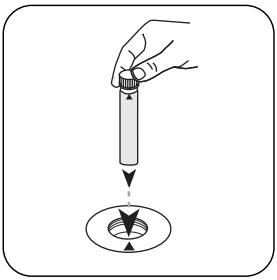
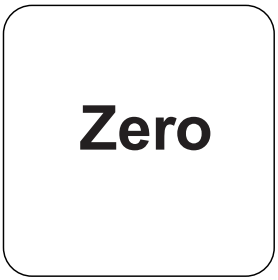


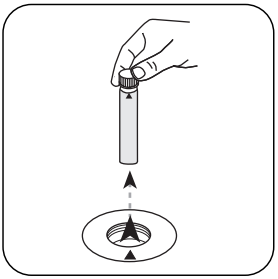
Laissez d'abord refroidir la cuvette à température ambiante puis effectuez les mesures.



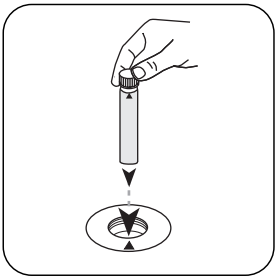
Placez la **cuvette du blanc** dans la chambre de mesure. Attention à la positionner correctement.



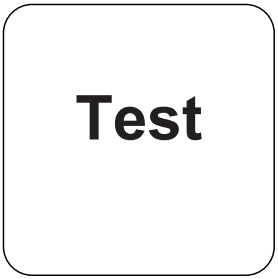
Appuyez sur la touche **ZERO**.



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



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 DOC.

Méthode chimique

Dichromate / H_2SO_4

Appendice

Interférences

Interférences persistantes

- Exceptionnellement, les constituants pour lesquels la capacité oxydante du réactif ne suffit pas, peuvent entraîner une baisse des résultats.

Interférences exclues

- Pour empêcher les erreurs de mesure par des éléments en suspension, il est important de placer soigneusement les cuvettes dans la chambre de mesure. En effet, la méthode cause la formation d'un précipité sur le fond des cuvettes.
- Les parois extérieures des cuvettes doivent être sèches et propres avant de procéder à l'analyse. La présence de traces de doigt ou de gouttes d'eau sur la cuvette entraînent des mesures erronées.
- Dans la version standard, le chlorure interfère à partir d'une concentration de 1000 mg/L. Dans la version sans mercure, la perturbation dépend de la concentration de chlorure et de la DCO. Des concentrations à partir de 100 mg/L de chlorure peuvent ici entraîner des perturbations importantes. Pour éliminer les concentrations élevées de chlorure dans les échantillons DCO, voir la méthode M130 COD LR TT.

Méthode Validation

Limite de détection	5.7 mg/L
Limite de détermination	17.2 mg/L
Fin de la gamme de mesure	300 mg/L
Sensibilité	-244 mg/L / Abs
Intervalle de confiance	2.56 mg/L
Déviation standard	1.06 mg/L
Coefficient de variation	0.67 %

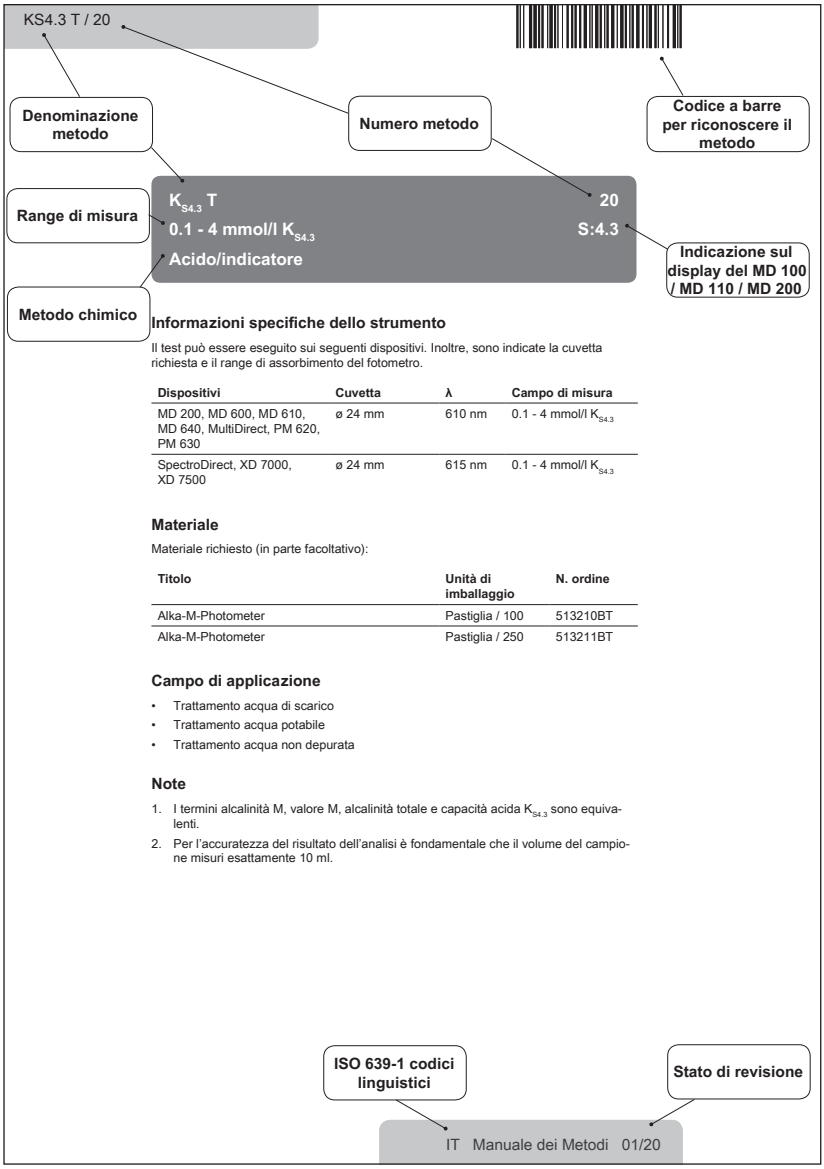
Conformité

ISO 15705:2002

Selon

ISO 15705:2002
DIN 38409 partie 41

[b)]Réacteur nécessaire pour DCO (150 °C), COT (120 °C), chrome total, phosphate total, azote total, (100 °C)



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.

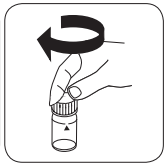
Svolgimento della misurazione

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

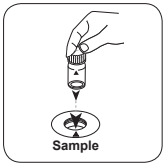
Selezionare il metodo nel dispositivo.

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**.



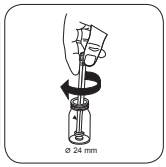
Chiudere la/e cuvetta/e.



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.

CSB LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
COD LR/25	25 pz.	2420720
COD LR/25, senza mercurio	25 pz.	2420710
COD LR/150	150 pz.	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 pz.	48371225
ValidCheck COD 120 mg/l + TON NN mg/l	1 pz.	48371425
ValidCheck WW Effluente Multistandard NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 pz.	48399612

Sono necessari inoltre i seguenti accessori.

Accessori	Unità di imballaggio	N. ordine
Termoreattore RD 125	1 pz.	2418940

Note

1. La cuvetta zero è stabile se conservata al buio.
2. La cuvetta zero e la cuvetta di reazione devono appartenere allo stesso lotto.
3. Le cuvette non devono essere introdotte calde nel vano cuvette. I valori di misura più stabili vengono rilevati se le cuvette vengono lasciate riposare per tutta la notte.

Rimozione di alta concentrazione di cloruro nei campioni di COD

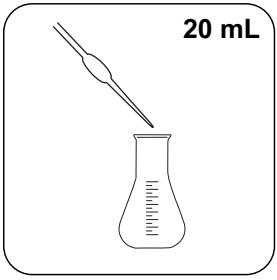
Se il contenuto di cloruro supera la tolleranza del test utilizzato, possono verificarsi interferenze durante la determinazione del COD. Per evitare questo problema, è necessario eseguire il seguente pretrattamento del campione:**Accessori:**

- 2 beute da 300 mL con attacco NS 29/32
- 2 assorbitore di HCl secondo DIN 38409
- 2 tappi in vetro con NS 29/32
- Pipette per 20 mL e 25 mL
- Agitatori magnetici e barre di agitazione magnetiche
- Termometro (campo di misura: 0 - 100°C)
- Bagno di ghiaccio

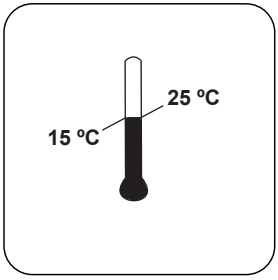
Reagenti:

- 12 - 14 g di calce sodata
- 50 mL H_2SO_4 (95 - 97%, 1,84 g/ml, senza COD)
- Acido cloridrico 10%, per pulire l'assorbitore dai residui di calce

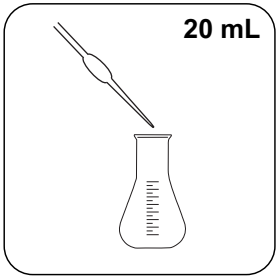
Il lavoro deve essere eseguito sotto una cappa di aspirazione!



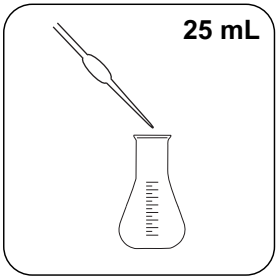
Immettere **20 mL di campione** nella recipiente del campione.



Lasciar raffreddare il campione a **temperatura ambiente**.

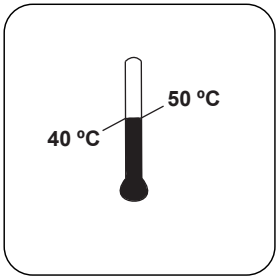


Immettere **20 mL di campione** nella recipiente del campione.

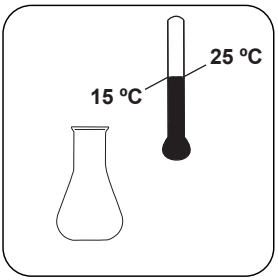


Immettere **25 mL di campione** nella recipiente del campione.

Non miscelare il contenuto!

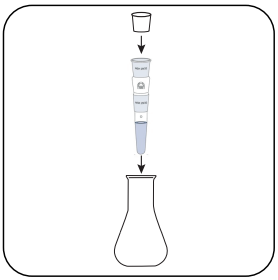


Lasciar raffreddare il campione a **temperatura ambiente**.

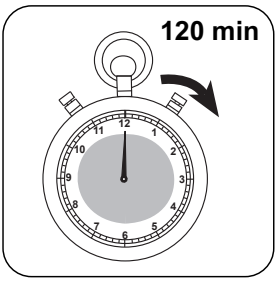


Lasciar raffreddare la/e cuvetta/e a temperatura ambiente.

Aggiungere **6 - 7 g di polvere soda lime**.



Miscelare il contenuto capovolgendo con cautela.



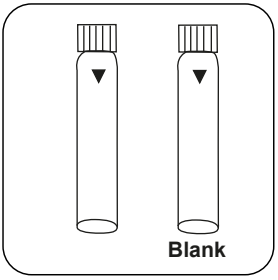
Riscaldare il campione per 120 minuti o finché non si sarà sciolto completamente.

Utilizzare questo campione per l'analisi della COD. Questo pretrattamento ha diluito il campione originale di un fattore di 2,05.

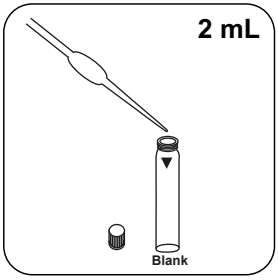
$_{\text{Campione di}}\text{COD} = {}_{\text{Visualizzazione}}\text{COD} \times 2{,}05$

Esecuzione della rilevazione CSB LR con test in cuvetta Vario

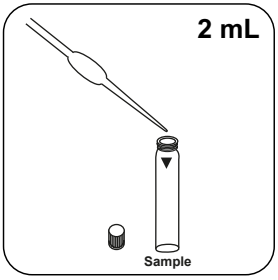
Selezionare il metodo nel dispositivo.



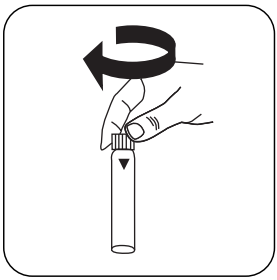
Preparare due **cuvette per reagenti**. Contrassegnare una cuvetta come cuvetta zero.



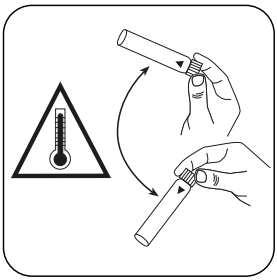
Immettere **2 mL di acqua demineralizzata** nella cuvetta zero.



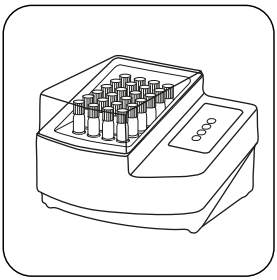
Immettere **2 mL di campione** nella cuvetta del campione.



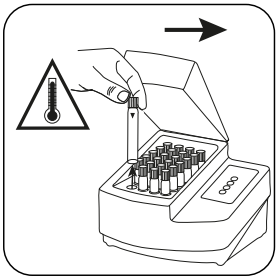
Chiudere la/e cuvetta/e.



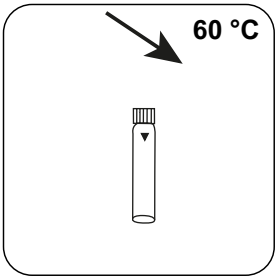
Miscelare il contenuto capovolgendo con cautela. **Attenzione: sviluppo di calore!**



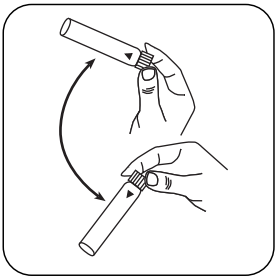
Sottoporre a digestione la/e cuvetta/e nel termoreattore preriscaldato per **120 minuti a 150 °C** .



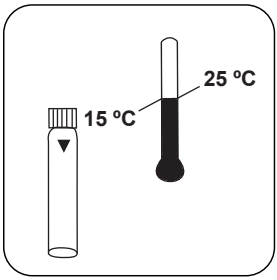
Prelevare la cuvetta dal termoreattore. **(Attenzione: la cuvetta è bollente!)**



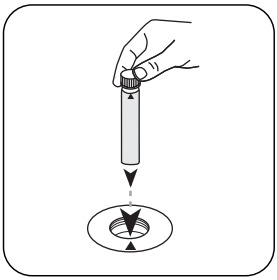
Lasciar raffreddare la/e cuvetta/e fino a circa 60 °C.



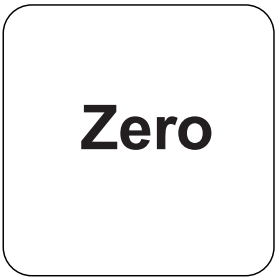
Miscelare il contenuto capovolgendo.



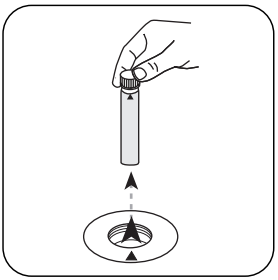
Lasciare prima raffreddare la cuvetta a temperatura ambiente e successivamente misurare.



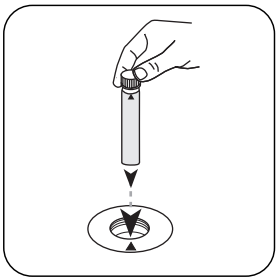
Posizionare la **cuvetta zero** nel vano di misurazione. Fare attenzione al posizionamento.



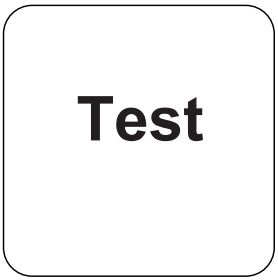
Premere il tasto **ZERO**.



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



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 COD.

Metodo chimico

Dichromate / H_2SO_4

Appendice

Interferenze

Interferenze permanenti

- In casi eccezionali gli ingredienti per i quali la capacità di ossidazione del reagente non è sufficiente possono portare a risultati troppo bassi.

Interferenze escludibili

- Per evitare errori di misurazione dovuti a sostanze in sospensione è importante inserire le cuvette nel vano di misura con cautela, in quanto sul fondo delle cuvette si forma un precipitato imputabile al metodo stesso.
- Prima di eseguire l'analisi è necessario che le pareti esterne delle cuvette siano pulite e asciutte. Eventuali impronte delle dita o gocce d'acqua sulla cuvetta provocano errori di misurazione.
- Nella versione standard, il cloruro interferisce da una concentrazione di 1000 mg/L. Nella versione senza mercurio, il disturbo dipende dalla concentrazione di cloruri e dal COD. Le concentrazioni da 100 mg/L di cloruro possono portare a disturbi significativi qui.

Validazione metodo

Limite di rilevabilità	3.2 mg/L
Limite di quantificazione	9.7 mg/L
Estremità campo di misura	150 mg/L
Sensibilità	-272 mg/L / Abs
Intervallo di confidenza	3.74 mg/L
Deviazione standard della procedura	1.55 mg/L
Coefficiente di variazione della procedura	2.02 %

Conforme

ISO 15705:2002

Secondo

ISO 15705:2002
DIN 38409 parte 41

[b)]Reattore richiesto per COD (150 ° C), TOC (120 ° C) e cromo totale, - fosfato, azoto, (100 ° C)

CSB MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
COD MR/25	25 pz.	2420721
COD MR/25, senza mercurio	25 pz.	2420711
COD MR/150	150 pz.	2420726
COD MR/150, senza mercurio	150 pz.	2420716
ValidCheck COD 500 mg/l + TON NN mg/l	1 pz.	48371625
ValidCheck WW Influente multistandard NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 pz.	48399712

Sono necessari inoltre i seguenti accessori.

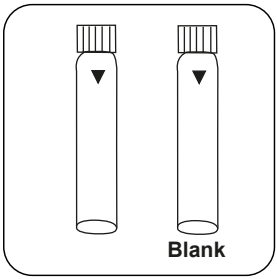
Accessori	Unità di imballaggio	N. ordine
Termoreattore RD 125	1 pz.	2418940

Note

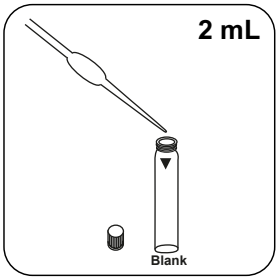
1. La cuvetta zero è stabile se conservata al buio. La cuvetta zero e la cuvetta di reazione devono appartenere allo stesso lotto.
2. Le cuvette non devono essere introdotte calde nel vano cuvette. I valori di misura più stabili vengono rilevati se le cuvette vengono lasciate riposare per tutta la notte.
3. Se si desidera una maggiore precisione, per i campioni con un CSB minore di 100 mg/L si consiglia di utilizzare il kit di cuvette CSB LR.

Esecuzione della rilevazione CSB MR con test in cuvetta Vario

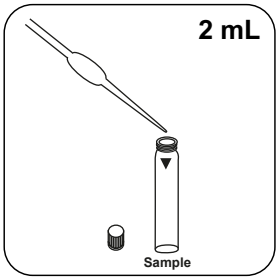
Selezionare il metodo nel dispositivo.



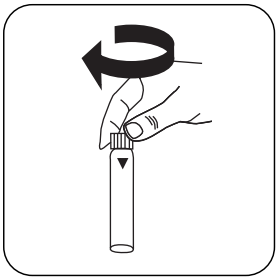
Preparare due **cuvette per reagenti**. Contrassegnare una cuvetta come cuvetta zero.



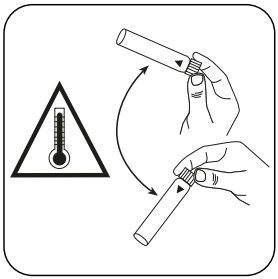
Immettere **2 mL di acqua demineralizzata** nella cuvetta zero.



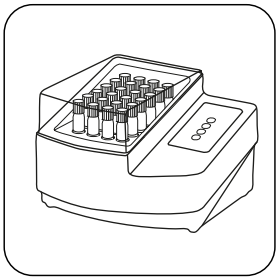
Immettere **2 mL di campione** nella cuvetta del campione.



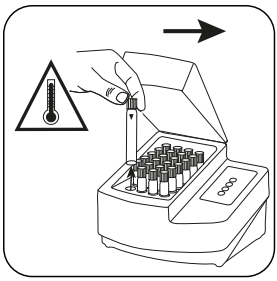
Chiudere la/e cuvetta/e.



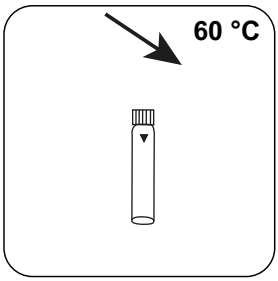
Miscelare il contenuto capovolgendo con cautela. **Attenzione: sviluppo di calore!**



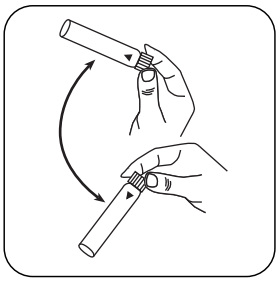
Sottoporre a digestione la/e cuvetta/e nel termoreattore preriscaldato per **120 minuti a 150 °C** .



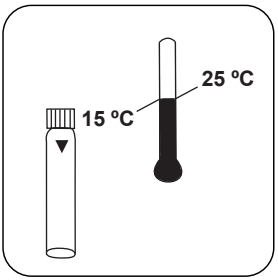
Prelevare la cuvetta dal termoreattore. **(Attenzione: la cuvetta è bollente!)**



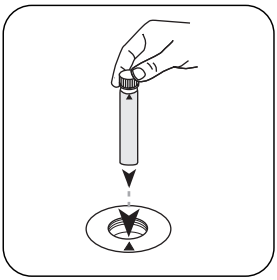
Lasciar raffreddare la/e cuvetta/e fino a circa 60 °C.



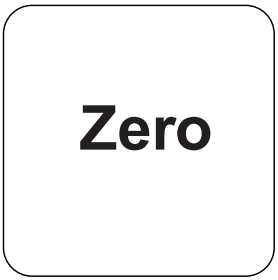
Miscelare il contenuto capovolgendo.



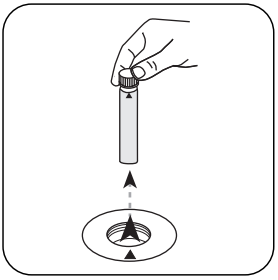
Lasciare prima raffreddare la cuvetta a temperatura ambiente e successivamente misurare.



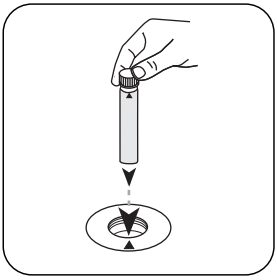
Posizionare la **cuvetta zero** nel vano di misurazione. Fare attenzione al posizionamento.



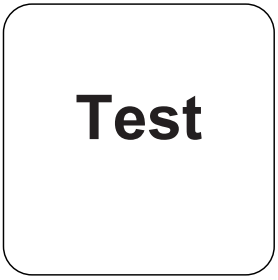
Premere il tasto **ZERO**.



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



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 COD.

Metodo chimico

Dichromate / H_2SO_4

Appendice

Interferenze

Interferenze permanenti

- In casi eccezionali gli ingredienti per i quali la capacità di ossidazione del reagente non è sufficiente possono portare a risultati troppo bassi.

Interferenze escludibili

- Per evitare errori di misurazione dovuti a sostanze in sospensione è importante inserire le cuvette nel vano di misura con cautela, in quanto sul fondo delle cuvette si forma un precipitato imputabile al metodo stesso.
- Prima di eseguire l'analisi è necessario che le pareti esterne delle cuvette siano pulite e asciutte. Eventuali impronte delle dita o gocce d'acqua sulla cuvetta provocano errori di misurazione.
- Nella versione standard, il cloruro interferisce da una concentrazione di 1000 mg/L. Nella versione senza mercurio, il disturbo dipende dalla concentrazione di cloruri e dal COD. Le concentrazioni da 100 mg/L di cloruro possono portare a disturbi significativi qui. Per rimuovere alte concentrazioni di cloruro nei campioni COD, vedere il metodo M130 COD LR TT.

Validazione metodo

Limite di rilevabilità	8.66 mg/L
Limite di quantificazione	25.98 mg/L
Estremità campo di misura	1500 mg/L
Sensibilità	2,141 mg/L / Abs
Intervallo di confidenza	18.82 mg/L
Deviazione standard della procedura	7.78 mg/L
Coefficiente di variazione della procedura	1.04 %

Conforme

ISO 15705:2002

Secondo

ISO 15705:2002
DIN 38409 parte 43

[b)]Reattore richiesto per COD (150 ° C), TOC (120 ° C) e cromo totale, - fosfato, azoto, (100 ° C)

CSB HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
COD HR/25	25 pz.	2420722
COD HR/25, senza mercurio	25 pz.	2420712
COD HR/150	150 pz.	2420727
ValidCheck COD 5000 mg/l + TON NN mg/l	1 pz.	48371825

Sono necessari inoltre i seguenti accessori.

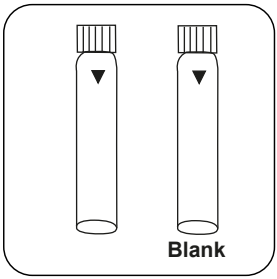
Accessori	Unità di imballaggio	N. ordine
Termoreattore RD 125	1 pz.	2418940
Pipetta 200 µl	1 pz.	365042
Pipetta automatica, 1-5 ml	1 pz.	365032

Note

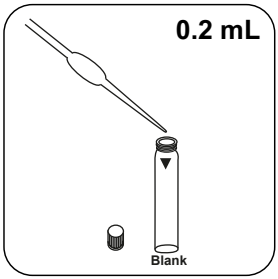
1. La cuvetta zero è stabile se conservata al buio. La cuvetta zero e la cuvetta di reazione devono appartenere allo stesso lotto.
2. Le cuvette non devono essere introdotte calde nel vano cuvette. I valori di misura più stabili vengono rilevati se le cuvette vengono lasciate riposare per tutta la notte.
3. Se si desidera una maggiore precisione, per i campioni con un CSB minore di 1 g/L si consiglia di utilizzare il kit di cuvette CSB MR, mentre per campioni con CSB maggiore 0,1 g/L il kit di cuvette CSB LR.

Esecuzione della rilevazione CSB HR con test in cuvetta Vario

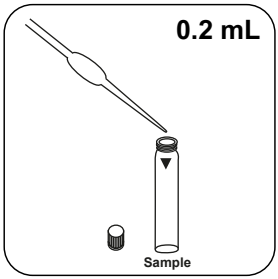
Selezionare il metodo nel dispositivo.



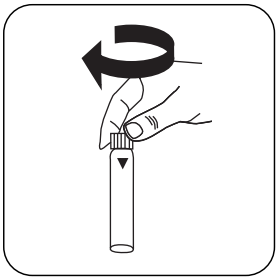
Preparare due **cuvette per reagenti**. Contrassegnare una cuvetta come cuvetta zero.



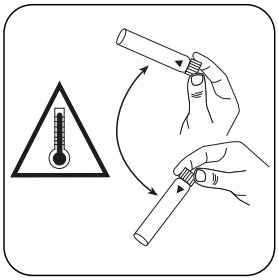
Immettere **0.2 mL di acqua demineralizzata** nella cuvetta zero.



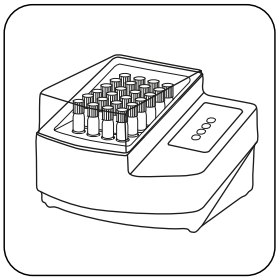
Immettere **0.2 mL di campione** nella cuvetta del campione.



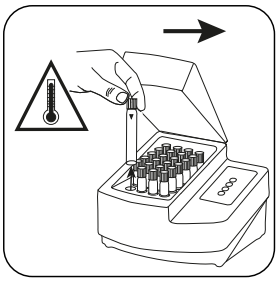
Chiudere la/e cuvetta/e.



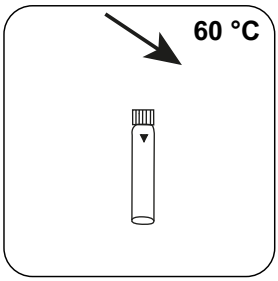
Miscelare il contenuto capovolgendo con cautela. **Attenzione: sviluppo di calore!**



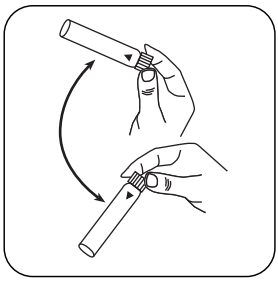
Sottoporre a digestione la/e cuvetta/e nel termoreattore preriscaldato per **120 minuti a 150 °C** .



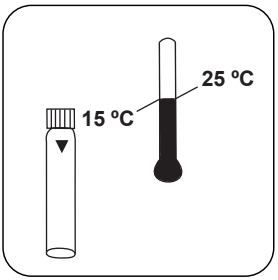
Prelevare la cuvetta dal termoreattore. **(Attenzione: la cuvetta è bollente!)**



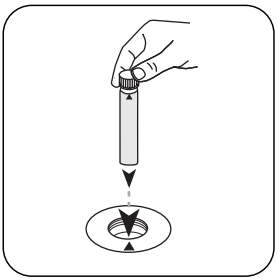
Lasciar raffreddare la/e cuvetta/e fino a circa 60 °C.



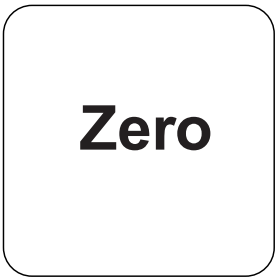
Miscelare il contenuto capovolgendo.



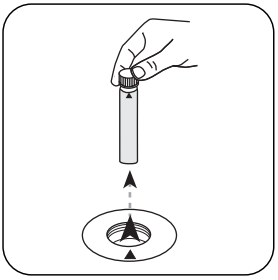
Lasciare prima raffreddare la cuvetta a temperatura ambiente e successivamente misurare.



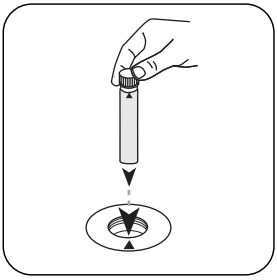
Posizionare la **cuvetta zero** nel vano di misurazione. Fare attenzione al posizionamento.



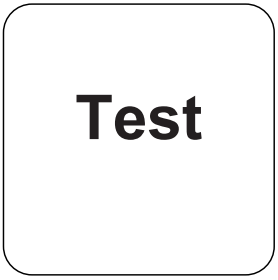
Premere il tasto **ZERO**.



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



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 g/L COD di (XD: mg/L COD).

Metodo chimico

Dichromate / H_2SO_4

Appendice

Interferenze

Interferenze permanenti

- In casi eccezionali gli ingredienti per i quali la capacità di ossidazione del reagente non è sufficiente possono portare a risultati troppo bassi.

Interferenze escludibili

- Per evitare errori di misurazione dovuti a sostanze in sospensione è importante inserire le cuvette nel vano di misura con cautela, in quanto sul fondo delle cuvette si forma un precipitato imputabile al metodo stesso.
- Prima di eseguire l'analisi è necessario che le pareti esterne delle cuvette siano pulite e asciutte. Eventuali impronte delle dita o gocce d'acqua sulla cuvetta provocano errori di misurazione.
- Nella versione standard, il cloruro interferisce da una concentrazione di 10000 mg/L. Nella versione senza mercurio, il disturbo dipende dalla concentrazione di cloruri e dal COD. Le concentrazioni da 100 mg/L di cloruro possono portare a disturbi significativi qui. Per rimuovere alte concentrazioni di cloruro nei campioni COD, vedere il metodo M130 COD LR TT.

Validazione metodo

Limite di rilevabilità	112.81 mg/L
Limite di quantificazione	338.43 mg/L
Estremità campo di misura	15 g/L
Sensibilità	21,164 mg/L / Abs
Intervallo di confidenza	70.48 mg/L
Deviazione standard della procedura	27.84 mg/L
Coefficiente di variazione della procedura	0.37 %

Conforme

ISO 15705:2002

Secondo

ISO 15705:2002

[b)]Reattore richiesto per COD (150 ° C), TOC (120 ° C) e cromo totale, - fosfato, azoto, (100 ° C)

CSB LMR TT **M133**

15 - 300 mg/L COD[b)] **LMr**

Dichromate / H_2SO_4

IT

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
COD LMR/25	25 pz.	2423120
ValidCheck COD 120 mg/l + TON NN mg/l	1 pz.	48371425

Sono necessari inoltre i seguenti accessori.

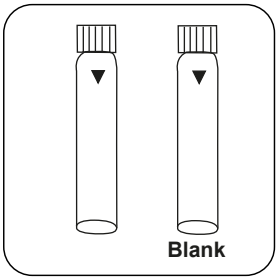
Accessori	Unità di imballaggio	N. ordine
Termoreattore RD 125	1 pz.	2418940

Note

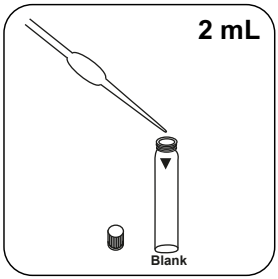
1. La cuvetta zero è stabile se conservata al buio. La cuvetta zero e la cuvetta di reazione devono appartenere allo stesso lotto.
2. Le cuvette non devono essere introdotte calde nel vano cuvette. I valori di misura più stabili vengono rilevati se le cuvette vengono lasciate riposare per tutta la notte.

Esecuzione della rilevazione CSB LMR con test in cuvetta

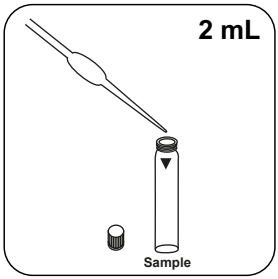
Selezionare il metodo nel dispositivo.



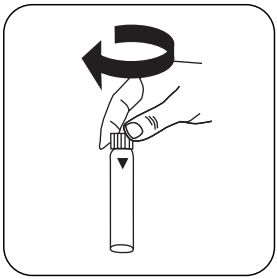
Preparare due **cuvette per reagenti**. Contrassegnare una cuvetta come cuvetta zero.



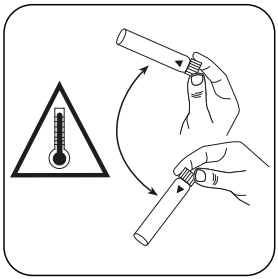
Immettere **2 mL di acqua demineralizzata** nella cuvetta zero.



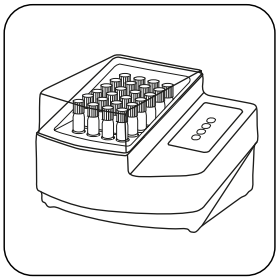
Immettere **2 mL di campione** nella cuvetta del campione.



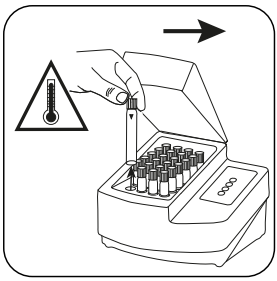
Chiudere la/e cuvetta/e.



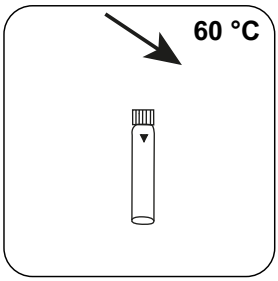
Miscelare il contenuto capovolgendo con cautela. **Attenzione: sviluppo di calore!**



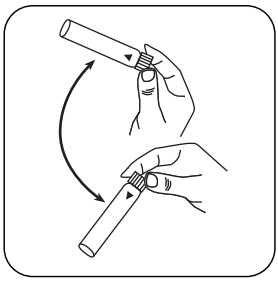
Sottoporre a digestione la/e cuvetta/e nel termoreattore preriscaldato per **120 minuti a 150 °C** .



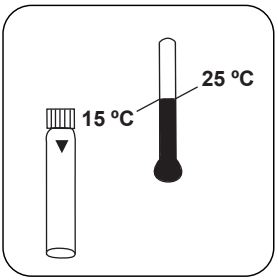
Prelevare la cuvetta dal termoreattore. **(Attenzione: la cuvetta è bollente!)**



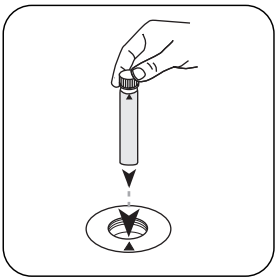
Lasciar raffreddare la/e cuvetta/e fino a circa 60 °C.



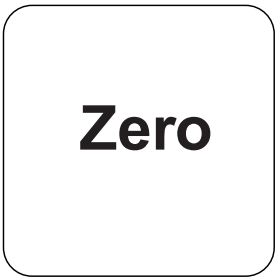
Miscelare il contenuto capovolgendo.



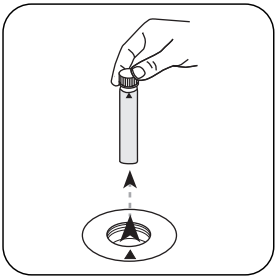
Lasciare prima raffreddare la cuvetta a temperatura ambiente e successivamente misurare.



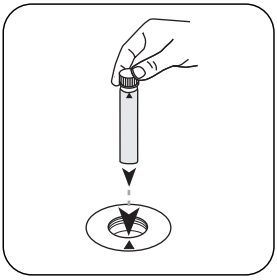
Posizionare la **cuvetta zero** nel vano di misurazione. Fare attenzione al posizionamento.



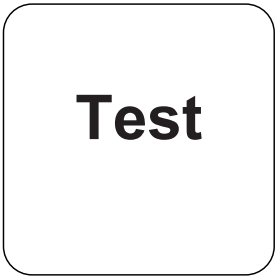
Premere il tasto **ZERO**.



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



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 COD.

Metodo chimico

Dichromate / H_2SO_4

Appendice

Interferenze

Interferenze permanenti

- In casi eccezionali gli ingredienti per i quali la capacità di ossidazione del reagente non è sufficiente possono portare a risultati troppo bassi.

Interferenze escludibili

- Per evitare errori di misurazione dovuti a sostanze in sospensione è importante inserire le cuvette nel vano di misura con cautela, in quanto sul fondo delle cuvette si forma un precipitato imputabile al metodo stesso.
- Prima di eseguire l'analisi è necessario che le pareti esterne delle cuvette siano pulite e asciutte. Eventuali impronte delle dita o gocce d'acqua sulla cuvetta provocano errori di misurazione.
- Nella versione standard, il cloruro interferisce da una concentrazione di 1000 mg/L. Nella versione senza mercurio, il disturbo dipende dalla concentrazione di cloruri e dal COD. Le concentrazioni da 100 mg/L di cloruro possono portare a disturbi significativi qui. Per rimuovere alte concentrazioni di cloruro nei campioni COD, vedere il metodo M130 COD LR TT.

Validazione metodo

Limite di rilevabilità	5.7 mg/L
Limite di quantificazione	17.2 mg/L
Estremità campo di misura	300 mg/L
Sensibilità	-244 mg/L / Abs
Intervallo di confidenza	2.56 mg/L
Deviazione standard della procedura	1.06 mg/L
Coefficiente di variazione della procedura	0.67 %

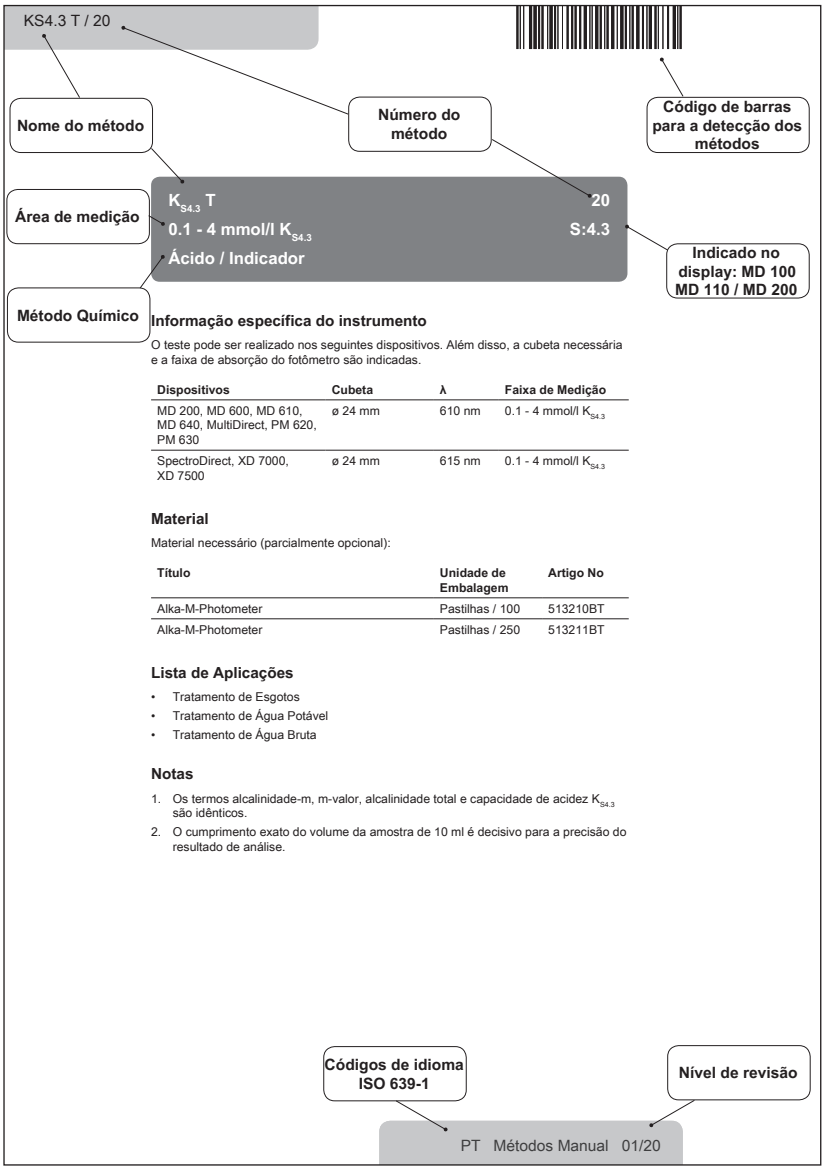
Conforme

ISO 15705:2002

Secondo

ISO 15705:2002
DIN 38409 parte 41

[b)]Reattore richiesto per COD (150 ° C), TOC (120 ° C) e cromo totale, - fosfato, azoto, (100 ° C)


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

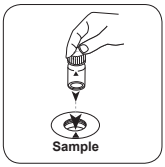
Realização da determinação Capacidade de acidez $K_{S4.3}$ com pastilha

Escolher o método no equipamento.

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

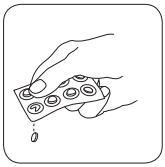
Encher a célula de 24 mm com **10 ml de amostra** .

Fechar a(s) célula(s).

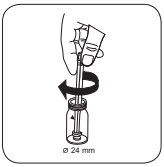


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

• • •



Pastilha ALKA-M-PHOTOMETER.



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

Fechar a(s) célula(s).

CQO LR TT M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
CSB LR/25	25 pc.	2420720
CSB LR/25, sem mercúrio	25 pc.	2420710
CSB LR/150	150 pc.	2420725
ValidCheck CSB 40 mg/l + TOC NN mg/l	1 pc.	48371225
ValidCheck CSB 120 mg/l + TON NN mg/l	1 pc.	48371425
ValidCheck WW Effluent Multistandard NH4-N/CSB/TOC/NO3-N/PO4-P/TP	1 pc.	48399612

São necessários os seguintes acessórios.

Acessórios	Unidade de Embalagem	Código do Produto
Termorreator RD 125	1 pc.	2418940

Notas

1. A célula zero é estável quando armazenada no escuro.
2. A célula zero e a célula de teste devem ser do mesmo lote.
3. As células não podem ser colocadas quentes no compartimento da célula. Os valores de medição mais estáveis são calculados quando as células são deixadas durante a noite.

Remoção de alta concentração de cloreto em amostras de CQO

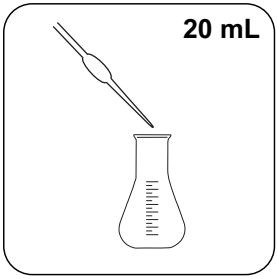
Se o teor de cloreto exceder a tolerância do ensaio utilizado, podem ocorrer interferências durante uma determinação da COD. Para evitar este problema, devem ser efectuados os seguintes pré-tratamentos da amostra:**Acessórios:**

- 2 frascos Erlenmeyer de 300 mL com ligação NS 29/32
- 2 absorvedores de HCl de acordo com DIN 38409
- 2 rolhas de vidro com NS 29/32
- Pipetas para 20 mL e 25 mL
- Agitadores magnéticos e barras de agitação magnéticas
- Termómetro (gama de medição: 0 - 100 °C)
- Banho de gelo

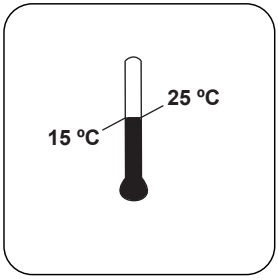
Reagentes:

- 12 - 14 g de cal soda
- 50 mL de H_2SO_4 (95 - 97%, 1,84 g/ml, sem COD)
- Ácido clorídrico 10%, para limpar o absorvedor dos resíduos de cal

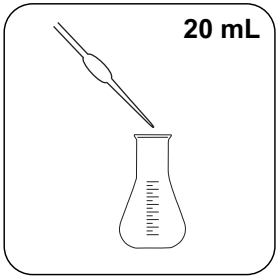
O trabalho deve ser realizado sob uma capota de fumos!



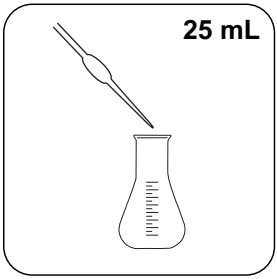
Adicionar **20 mL de amostra** ao recipiente de amostra.



Deixar a amostra arrefecer até à **temperatura ambiente** .

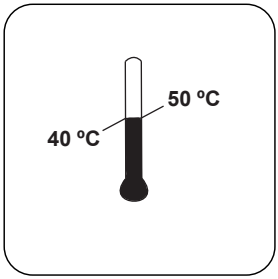


Adicionar **20 mL de amostra** ao recipiente de amostra.



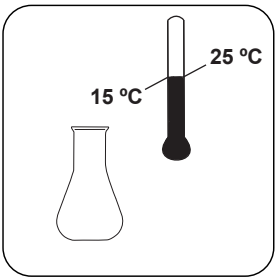
Adicionar **25 mL de amostra** ao recipiente de amostra.

Não misturar o conteúdo!



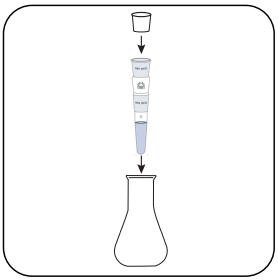
Deixar a amostra arrefecer até à **temperatura ambiente** .

PT

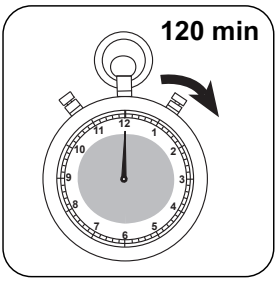


Deixar a(s) célula(s) arrefecer(em) até à temperatura ambiente.

Adicionar **6 - 7 g soda lime de pó**.



Misturar o conteúdo girando com cuidado.



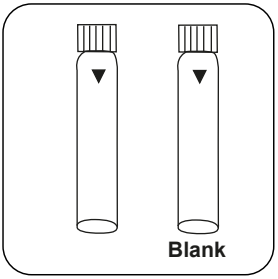
A amostra deve **aquecer durante 120 minutos,** ou até tudo se ter totalmente dissolvido.

Utilizar esta amostra para análise de COD. Este pré-tratamento diluiu a amostra original por um factor de 2,05.

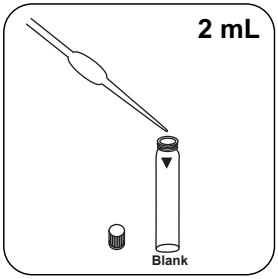
$CQO_{amostra} = CQO_{visualização\ de} \times 2{,}05$

Realização da determinação CSB LR com teste de célula Vario

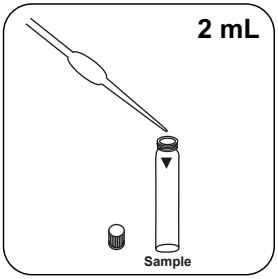
Escolher o método no equipamento.



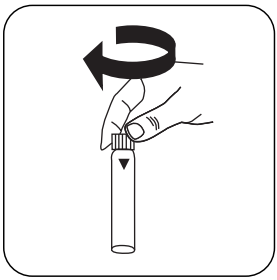
Preparar duas **células de reagentes** . Identificar uma célula como célula zero.



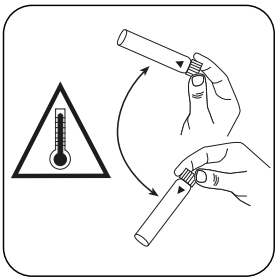
Adicionar **2 mL de água desmineralizada** à célula zero.



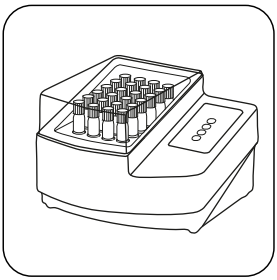
Adicionar **2 mL de amostra** à célula de amostra.



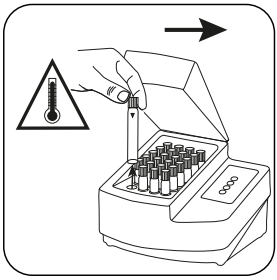
Fechar a(s) célula(s).



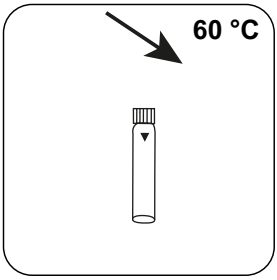
Misturar o conteúdo girando com cuidado. **Atenção: Formação de calor!**



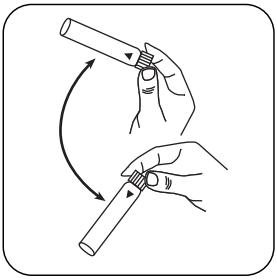
Digerir a(s) célula(s) no reator térmico pré-aquecido durante **120 minutos a 150 °C** .



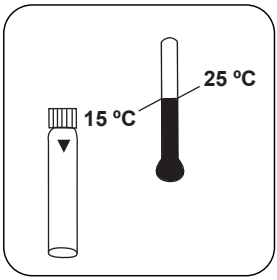
Retirar a célula do reator térmico. **(Atenção: A célula está quente!)**



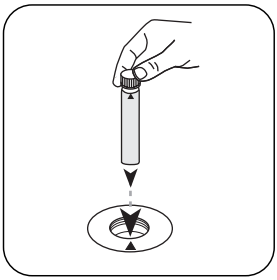
Deixar a(s) célula(s) arrefecer(em) até 60 °C.



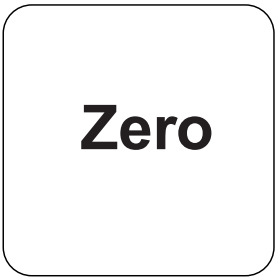
Misturar o conteúdo girando.



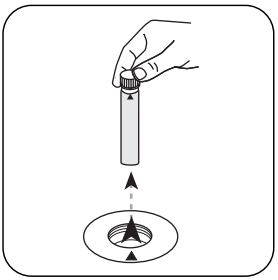
Deixar a célula arrefecer primeiro até à temperatura ambiente e depois medir.



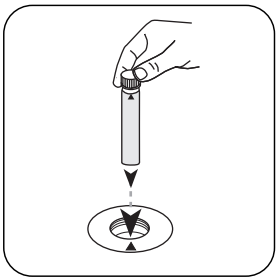
Colocar a **célula zero** no compartimento de medição. Observar o posicionamento.



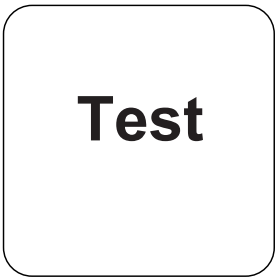
Premir a tecla **ZERO**.



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



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 CQO.

Método Químico

Dichromate / H_2SO_4

Apêndice

Texto de Interferências

Interferências Pesistentes

- Em casos excecionais, os componentes para os quais a capacidade de oxidação do reagente não é suficiente podem causar um resultados demasiado baixos.

Interferências Removíveis

- Para impedir medições erradas por matérias em suspensão, é importante colocar as células cuidadosamente no compartimento de medição, uma vez que se forma um sedimento no fundo das células, dependendo do método.
- As paredes exteriores das células têm de estar limpas e secas antes de realizar a análise. Impressões digitais ou gotas de água na célula levam a medições erradas.
- Na versão padrão, o cloreto interfere a partir de uma concentração de 1000 mg/L. Na versão sem mercúrio, a perturbação depende da concentração de cloreto e da DQO. Concentrações de cloreto de 100 mg/L podem causar distúrbios significativos aqui.

Validação de método

Limite de Detecção	3.2 mg/L
Limite de Determinação	9.7 mg/L
Fim da Faixa de Medição	150 mg/L
Sensibilidade	-272 mg/L / Abs
Faixa de Confiança	3.74 mg/L
Desvio Padrão	1.55 mg/L
Coeficiente de Variação	2.02 %

Conformidade

ISO 15705:2002

De acordo com

ISO 15705:2002
DIN 38409 Parte 41

[b]Reactor necessário para DQO (150 ° C), TOC (120 ° C) e crómio total, - fosfato, azoto (100 ° C)

CQO MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
CSB MR/25	25 pc.	2420721
CSB MR/25, sem mercúrio	25 pc.	2420711
CSB MR/150	150 pc.	2420726
CSB MR/150, sem mercúrio	150 pc.	2420716
ValidCheck CSB 500 mg/l + TON NN mg/l	1 pc.	48371625
ValidCheck WW Influent Multistandard NH4-N/CSB/TOC/NO3-N/PO4-P/TP	1 pc.	48399712

São necessários os seguintes acessórios.

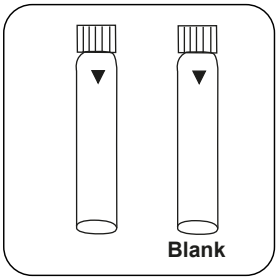
Acessórios	Unidade de Embalagem	Código do Produto
Termorreator RD 125	1 pc.	2418940

Notas

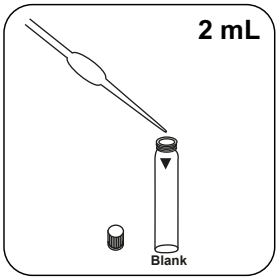
1. A célula zero é estável quando armazenada no escuro. A célula zero e a célula de teste devem ser do mesmo lote.
2. As células não podem ser colocadas quentes no compartimento da célula. Os valores de medição mais estáveis são calculados quando as células são deixadas durante a noite.
3. Em amostras com um CSB inferior a 100 mg/L recomenda-se usar o conjunto de células CSB LR, quando se pretende uma maior precisão.

Realização da determinação CSB MR com teste de célula Vario

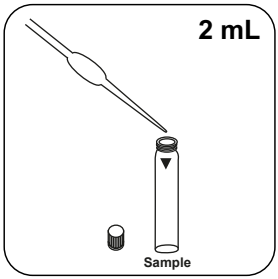
Escolher o método no equipamento.



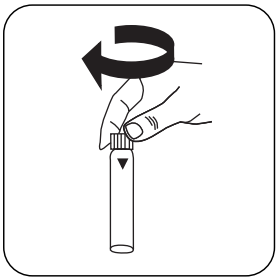
Preparar duas **células de reagentes** . Identificar uma célula como célula zero.



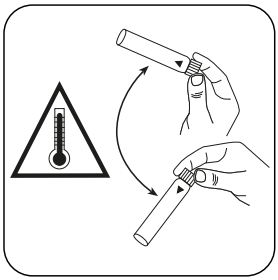
Adicionar **2 mL de água desmineralizada** à célula zero.



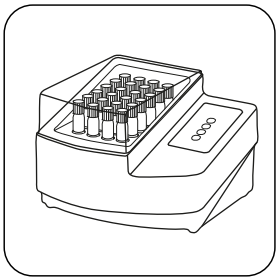
Adicionar **2 mL de amostra** à célula de amostra.



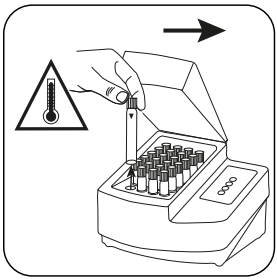
Fechar a(s) célula(s).



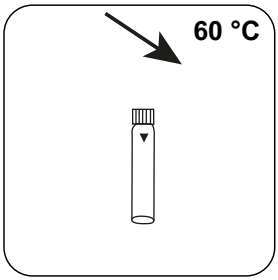
Misturar o conteúdo girando com cuidado. **Atenção: Formação de calor!**



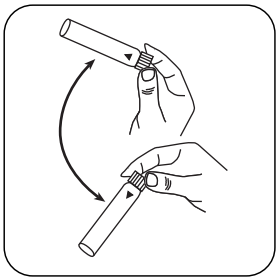
Digerir a(s) célula(s) no reator térmico pré-aquecido durante **120 minutos a 150 °C** .



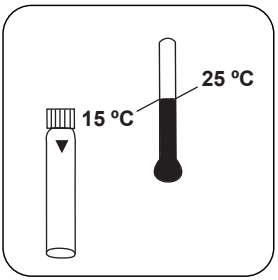
Retirar a célula do reator térmico. **(Atenção: A célula está quente!)**



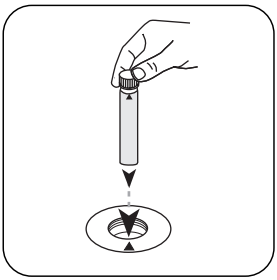
Deixar a(s) célula(s) arrefecer(em) até 60 °C.



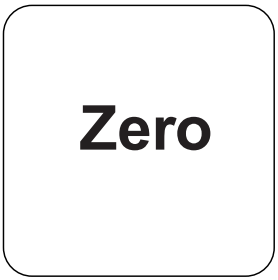
Misturar o conteúdo girando.



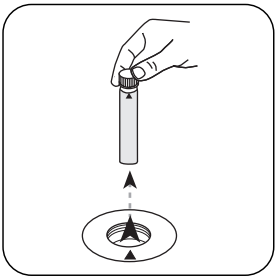
Deixar a célula arrefecer primeiro até à temperatura ambiente e depois medir.



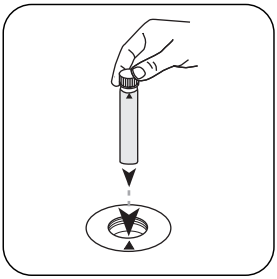
Colocar a **célula zero** no compartimento de medição. Observar o posicionamento.



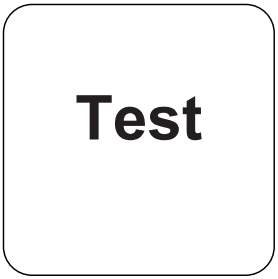
Premir a tecla **ZERO**.



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



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 CQO.

Método Químico

Dichromate / H_2SO_4

Apêndice

Texto de Interferências

Interferências Pesistentes

- Em casos excecionais, os componentes para os quais a capacidade de oxidação do reagente não é suficiente podem causar um resultados demasiado baixos.

Interferências Removíveis

- Para impedir medições erradas por matérias em suspensão, é importante colocar as células cuidadosamente no compartimento de medição, uma vez que se forma um sedimento no fundo das células, dependendo do método.
- As paredes exteriores das células têm de estar limpas e secas antes de realizar a análise. Impressões digitais ou gotas de água na célula levam a medições erradas.
- Na versão padrão, o cloreto interfere a partir de uma concentração de 1000 mg/L. Na versão sem mercúrio, a perturbação depende da concentração de cloreto e da DQO. Concentrações de cloreto de 100 mg/L podem causar distúrbios significativos aqui. Para remover altas concentrações de cloreto em amostras COD, consulte o método M130 COD LR TT.

Validação de método

Limite de Detecção	8.66 mg/L
Limite de Determinação	25.98 mg/L
Fim da Faixa de Medição	1500 mg/L
Sensibilidade	2,141 mg/L / Abs
Faixa de Confiança	18.82 mg/L
Desvio Padrão	7.78 mg/L
Coeficiente de Variação	1.04 %

Conformidade

ISO 15705:2002

De acordo com

ISO 15705:2002
DIN 38409 Parte 43

[b]Reactor necessário para DQO (150 ° C), TOC (120 ° C) e crómio total, - fosfato, azoto (100 ° C)

CQO HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
CSB HR/25	25 pc.	2420722
CSB HR/25, livre de mercúrio	25 pc.	2420712
CSB HR/150	150 pc.	2420727
ValidCheck CSB 5000 mg/l + TON NN mg/l	1 pc.	48371825

São necessários os seguintes acessórios.

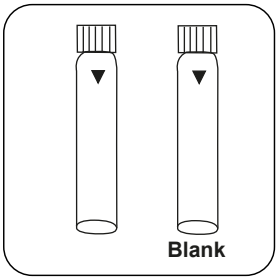
Acessórios	Unidade de Embalagem	Código do Produto
Termorreator RD 125	1 pc.	2418940
Pipeta 200 µl	1 pc.	365042
Pipeta automática, 1-5 ml	1 pc.	365032

Notas

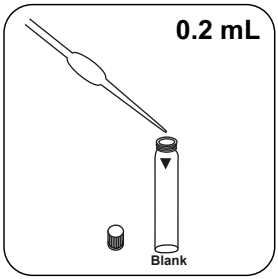
1. A célula zero é estável quando armazenada no escuro. A célula zero e a célula de teste devem ser do mesmo lote.
2. As células não podem ser colocadas quentes no compartimento da célula. Os valores de medição mais estáveis são calculados quando as células são deixadas durante a noite.
3. Em amostras com um CSB inferior a 1 g/L recomenda-se usar o conjunto de células CSB MR, ou no caso de amostras inferiores a 0,1 g/L o conjunto de células CSB LR, quando se pretende uma maior precisão.

Realização da determinação CSB HR com teste de célula Vario

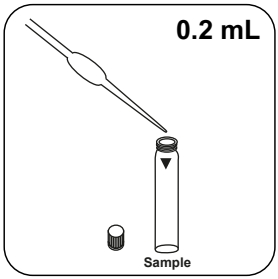
Escolher o método no equipamento.



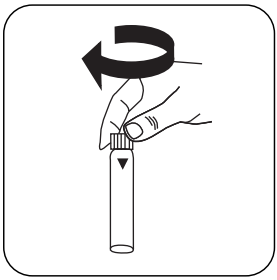
Preparar duas **células de reagentes** . Identificar uma célula como célula zero.



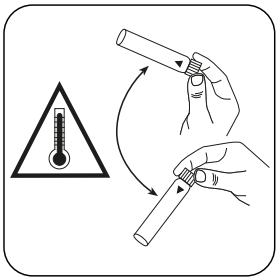
Adicionar **0.2 mL de água desmineralizada** à célula zero.



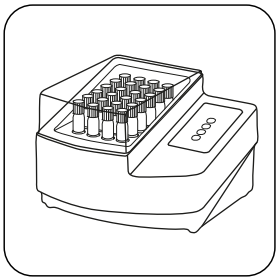
Adicionar **0.2 mL de amostra** à célula de amostra.



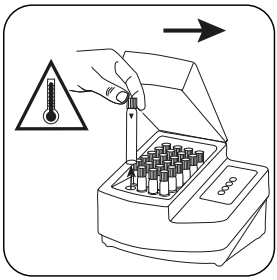
Fechar a(s) célula(s).



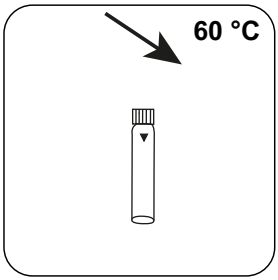
Misturar o conteúdo girando com cuidado. **Atenção: Formação de calor!**



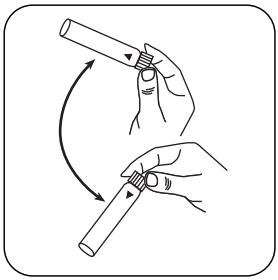
Digerir a(s) célula(s) no reator térmico pré-aquecido durante **120 minutos a 150 °C** .



Retirar a célula do reator térmico. **(Atenção: A célula está quente!)**

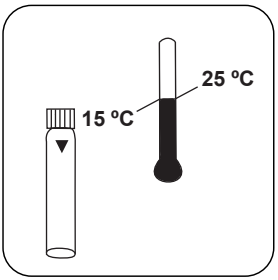


Deixar a(s) célula(s) arrefecer(em) até 60 °C.

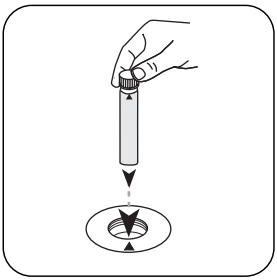


Misturar o conteúdo girando.

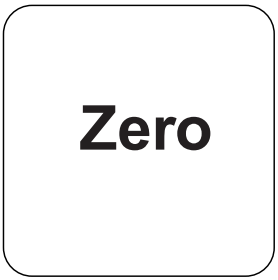
PT



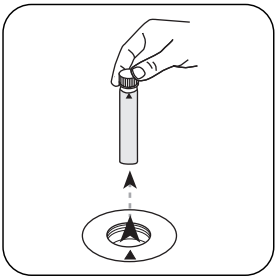
Deixar a célula arrefecer primeiro até à temperatura ambiente e depois medir.



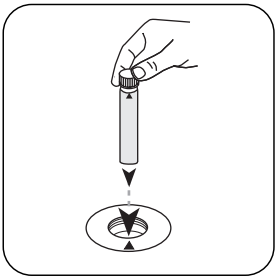
Colocar a **célula zero** no compartimento de medição. Observar o posicionamento.



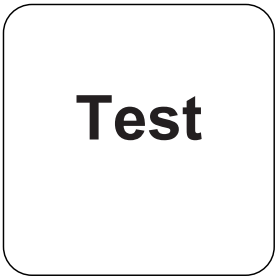
Premir a tecla **ZERO**.



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



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



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

No visor aparece o resultado em g/L CQO (XD: mg/L CQO).

Método Químico

Dichromate / H_2SO_4

Apêndice

Texto de Interferências

Interferências Pesistentes

- Em casos excecionais, os componentes para os quais a capacidade de oxidação do reagente não é suficiente podem causar um resultados demasiado baixos.

Interferências Removíveis

- Para impedir medições erradas por matérias em suspensão, é importante colocar as células cuidadosamente no compartimento de medição, uma vez que se forma um sedimento no fundo das células, dependendo do método.
- As paredes exteriores das células têm de estar limpas e secas antes de realizar a análise. Impressões digitais ou gotas de água na célula levam a medições erradas.
- Na versão padrão, o cloreto interfere a partir de uma concentração de 10000 mg/L. Na versão sem mercúrio, a perturbação depende da concentração de cloreto e da DQO. Concentrações de cloreto de 100 mg/L podem causar distúrbios significativos aqui. Para remover altas concentrações de cloreto em amostras COD, consulte o método M130 COD LR TT.

Validação de método

Limite de Detecção	112.81 mg/L
Limite de Determinação	338.43 mg/L
Fim da Faixa de Medição	15 g/L
Sensibilidade	21,164 mg/L / Abs
Faixa de Confiança	70.48 mg/L
Desvio Padrão	27.84 mg/L
Coeficiente de Variação	0.37 %

Conformidade

ISO 15705:2002

De acordo com

ISO 15705:2002

[b]Reactor necessário para DQO (150 ° C), TOC (120 ° C) e crómio total, - fosfato, azoto (100 ° C)

CQO LMR TT M133

15 - 300 mg/L COD[b)] LMr

Dichromate / H_2SO_4

PT

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
CSB LMR/25	25 pc.	2423120
ValidCheck CSB 120 mg/l + TON NN mg/l	1 pc.	48371425

São necessários os seguintes acessórios.

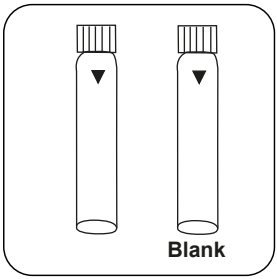
Acessórios	Unidade de Embalagem	Código do Produto
Termorreator RD 125	1 pc.	2418940

Notas

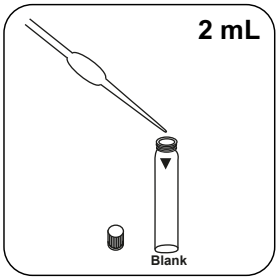
1. A célula zero é estável quando armazenada no escuro. A célula zero e a célula de teste devem ser do mesmo lote.
2. As células não podem ser colocadas quentes no compartimento da célula. Os valores de medição mais estáveis são calculados quando as células são deixadas durante a noite.

Realização da determinação CSB LMR com teste de célula

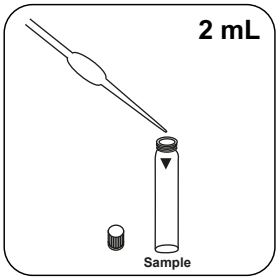
Escolher o método no equipamento.



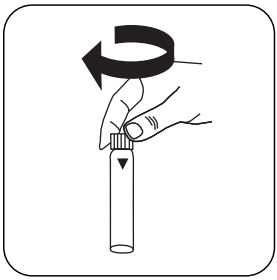
Preparar duas **células de reagentes** . Identificar uma célula como célula zero.



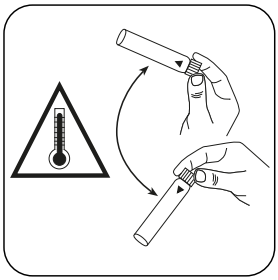
Adicionar **2 mL de água desmineralizada** à célula zero.



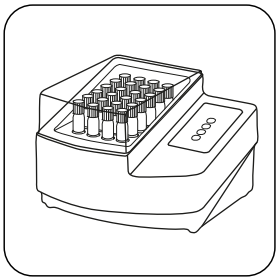
Adicionar **2 mL de amostra** à célula de amostra.



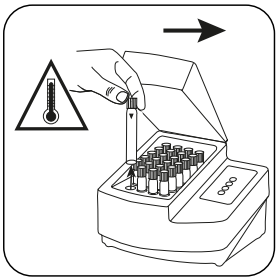
Fechar a(s) célula(s).



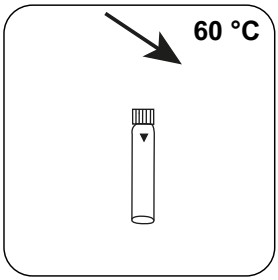
Misturar o conteúdo girando com cuidado. **Atenção: Formação de calor!**



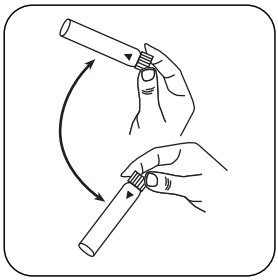
Digerir a(s) célula(s) no reator térmico pré-aquecido durante **120 minutos a 150 °C** .



Retirar a célula do reator térmico. **(Atenção: A célula está quente!)**

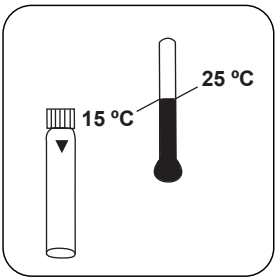


Deixar a(s) célula(s) arrefecer(em) até 60 °C.

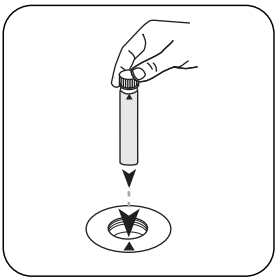


Misturar o conteúdo girando.

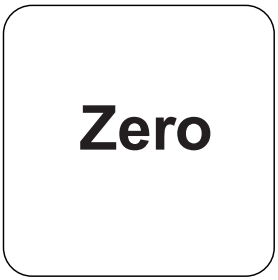
PT



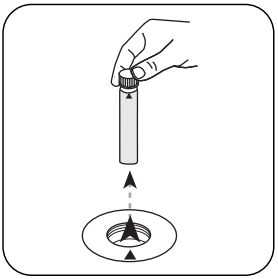
Deixar a célula arrefecer primeiro até à temperatura ambiente e depois medir.



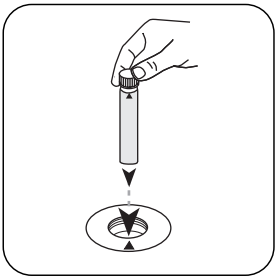
Colocar a **célula zero** no compartimento de medição. Observar o posicionamento.



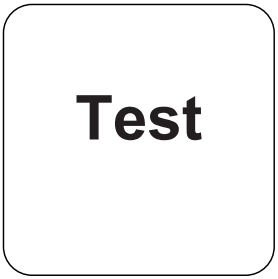
Premir a tecla **ZERO**.



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



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 CQO.

Método Químico

Dichromate / H_2SO_4

Apêndice

Texto de Interferências

Interferências Pesistentes

- Em casos excecionais, os componentes para os quais a capacidade de oxidação do reagente não é suficiente podem causar um resultados demasiado baixos.

Interferências Removíveis

- Para impedir medições erradas por matérias em suspensão, é importante colocar as células cuidadosamente no compartimento de medição, uma vez que se forma um sedimento no fundo das células, dependendo do método.
- As paredes exteriores das células têm de estar limpas e secas antes de realizar a análise. Impressões digitais ou gotas de água na célula levam a medições erradas.
- Na versão padrão, o cloreto interfere a partir de uma concentração de 1000 mg/L. Na versão sem mercúrio, a perturbação depende da concentração de cloreto e da DQO. Concentrações de cloreto de 100 mg/L podem causar distúrbios significativos aqui. Para remover altas concentrações de cloreto em amostras COD, consulte o método M130 COD LR TT.

Validação de método

Limite de Detecção	5.7 mg/L
Limite de Determinação	17.2 mg/L
Fim da Faixa de Medição	300 mg/L
Sensibilidade	-244 mg/L / Abs
Faixa de Confiança	2.56 mg/L
Desvio Padrão	1.06 mg/L
Coeficiente de Variação	0.67 %

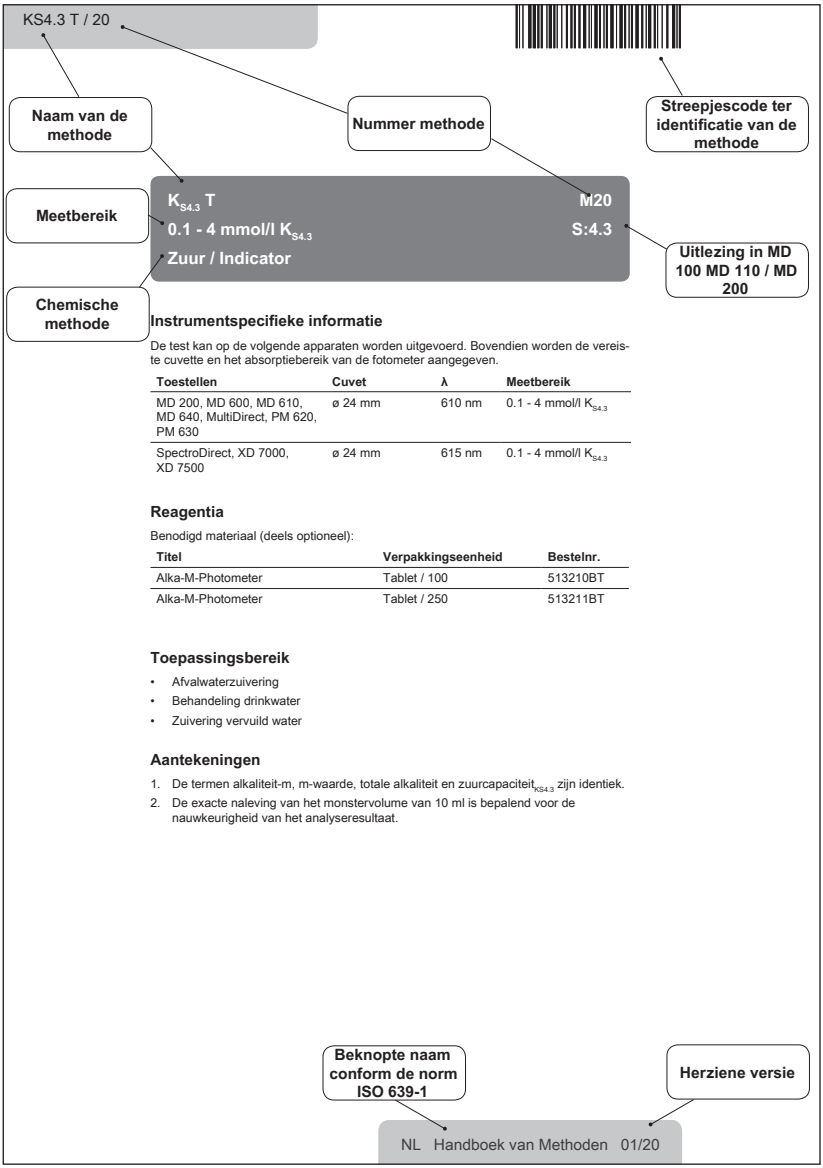
Conformidade

ISO 15705:2002

De acordo com

ISO 15705:2002
DIN 38409 Parte 41

[b]Reactor necessário para DQO (150 ° C), TOC (120 ° C) e crómio total, - fosfato, azoto (100 ° C)


KS4.3 T / 20
Naam van de methode
Nummer methode
Streepjescode ter identificatie van de methode
Meetbereik
Chemische methode
Uitlezing in MD 100 MD 110 / MD 200
K S4.3 T
M20
0.1 - 4 mmol/l K S4.3
S:4.3
Zuur / Indicator
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.
Beknopte naam conform de norm ISO 639-1
Herziene versie
NL Handboek van Methoden 01/20

Uitvoering van de meting

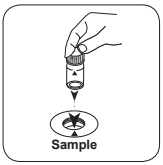
Uitvoering van de bepaling Zuurcapaciteit $K_{S4.3}$ met tablet

De methode in het apparaat selecteren.

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

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

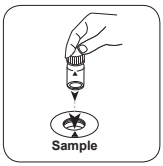
De spoelbakjes afsluiten.



Het **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 $K_{S4.3}$.

CZV LR TT **M130**

3 - 150 mg/L COD[b)] **Lr**

Dichromate / H_2SO_4

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
CSB LR/25	25 St.	2420720
CSB LR/25, kwikvrij	25 St.	2420710
CSB LR/150	150 St.	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 St.	48371225
ValidCheck COD 120 mg/l + TON NN mg/l	1 St.	48371425
ValidCheck WW Effluent Multistandaard NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 St.	48399612

De volgende toebehoren zijn eveneens vereist.

Toebehoren	Verpakkingseenheid	Bestelnr.
Thermoreactor RD 125	1 St.	2418940

Aantekeningen

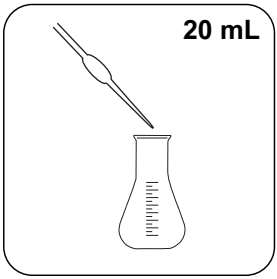
1. Het nulspoelbakje is stabiel bij opslag in het donker.
2. Het nul- en testspoelbakje moeten uit dezelfde partij komen.
3. De spoelbakjes mogen niet warm in de worden geplaatst. De meest stabiele meetwaarden worden bepaald wanneer de spoelbakjes een nacht kunnen blijven staan.

Verwijdering van hoge chlorideconcentraties in CZV-monsters

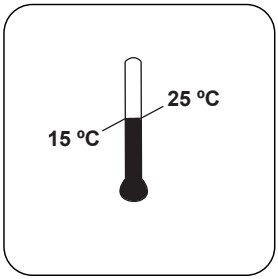
Als het chloridegehalte hoger is dan de tolerantie van de gebruikte test, kan er tijdens een CZV-bepaling storing optreden. Om dit probleem te voorkomen, moet de volgende voorbehandeling van het monster worden uitgevoerd:**Accessoires:**

- 2 Erlenmeyer-kolven 300 mL met aansluiting NS 29/32
- 2 HCl absorber volgens DIN 38409
- 2 glazen stoppers met NS 29/32
- Pipetten voor 20 mL en 25 mL
- Magnetische roerders en magnetische roerstaven
- Thermometer (meetbereik: 0 - 100 °C)
- Ijsbad
- **Reagenten:**
- 12 - 14 g sodalime
- 50 mL H2SO4 (95 - 97%, 1,84 g/ml, CZV-vrij)
- Zoutzuur 10%, om de absorber te reinigen van kalkresten

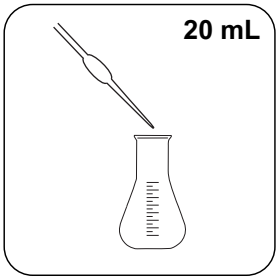
Het werk moet worden uitgevoerd onder een zuurkast!



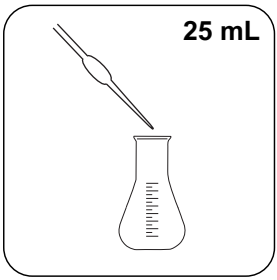
20 mL staal aan de staalbeker toevoegen.



Het staal laten afkoelen tot **kamertemperatuur**.

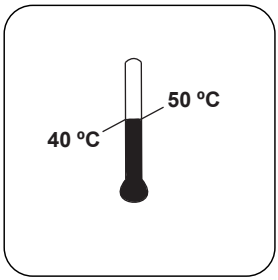


20 mL staal aan de staalbeker toevoegen.

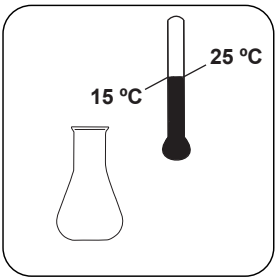


25 mL staal aan de staalbeker toevoegen.

De inhoud niet mengen!

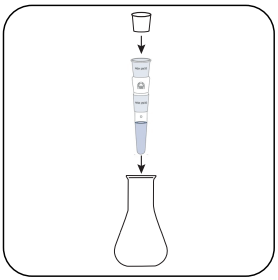


Het staal laten afkoelen tot **kamertemperatuur**.

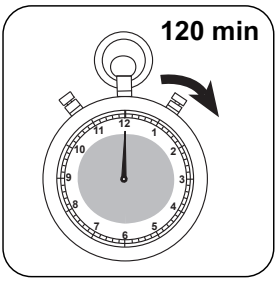


De spoelbakjes laten afkoelen tot kamertemperatuur.

6 - 7 g soda lime poeder toevoegen.



De inhoud mengen door voorzichtig om te draaien.

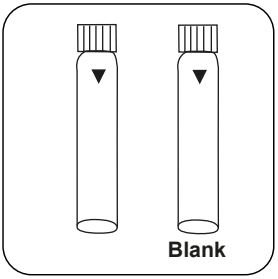


Het staal gedurende **120 minuten verwarmen,** of zolang tot alles volledig is opgelost.

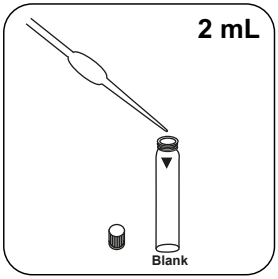
Gebruik dit monster voor CZV-analyse. Door deze voorbehandeling is het oorspronkelijke monster met een factor 2,05 verdund.
$COD_{monster} = COD_{weergave} \times 2.05$

Uitvoering van de bepaling CSB LR met Vario-cuvettentest

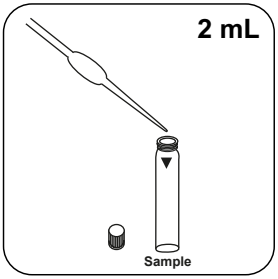
De methode in het apparaat selecteren.



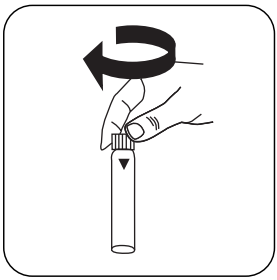
Twee **reagensspoelbakjes** klaarzetten. Een als nulspoelbakje kenmerken.



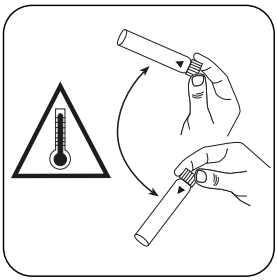
2 mL gedeïoniseerd water in het nulspoelbakje doen.



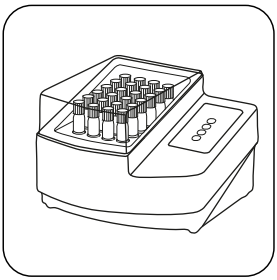
2 mL staal in het staalspoelbakje doen.



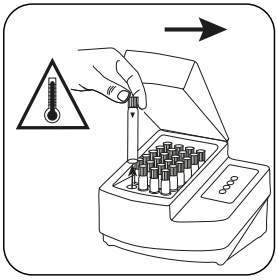
De spoelbakjes afsluiten.



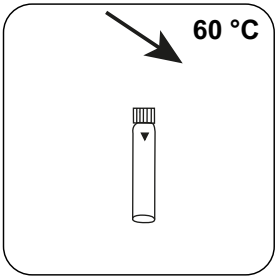
De inhoud mengen door voorzichtig om te draaien. **Opgelet: Warmteontwikkeling!**



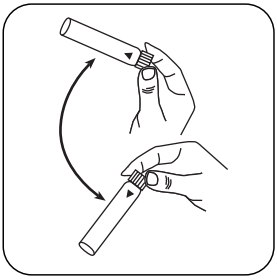
De spoelbakjes in de voorverwarmde thermoreactor gedurende **120 minuten bij 150 °C** ontsluiten.



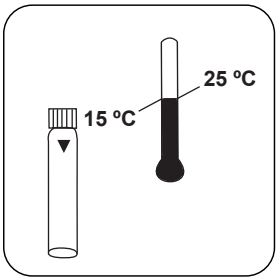
spoelbakje uit de thermoreactor nemen. **(Opgelet: het spoelbakje is heet!)**



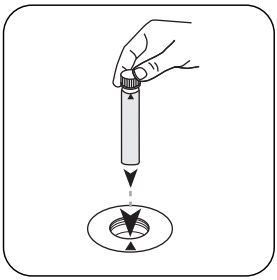
De spoelbakjes laten afkoelen tot ongeveer 60 °C.



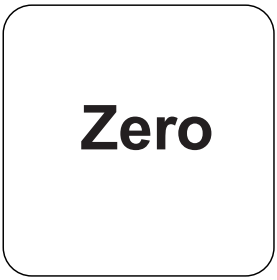
De inhoud mengen door om te draaien.



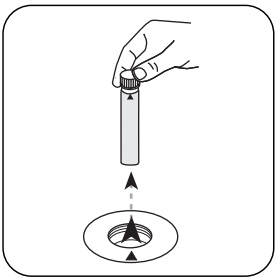
Het spoelbakje eerst laten afkoelen tot kamertemperatuur, dan meten.



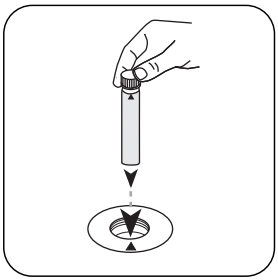
Het **nulspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



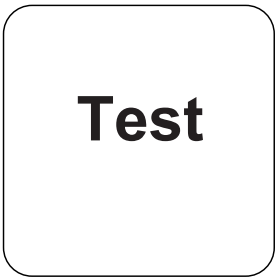
De toets **NUL** indrukken.



Het **spoelbakje** uit de meetschacht nemen.



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



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

De display toont het resultaat in mg/L CSB.

Chemische methode

Dichromate / H_2SO_4

Aanhangsel

Verstoringen

Permanente verstoringen

- In uitzonderlijke gevallen kunnen ingrediënten waarvoor het oxiderend vermogen van het reagens niet voldoende is, tot verminderde resultaten leiden.

Uit te sluiten verstoringen

- Om onjuiste metingen door zwevende deeltjes te voorkomen, is het belangrijk om de spoelbakjes zorgvuldig in de meetschacht te plaatsen, omdat zich door de methode een neerslag vormt op de bodem van de spoelbakjes.
- De buitenwanden van de cuvetten moeten schoon en droog zijn voordat de analyse wordt uitgevoerd. Vingerafdrukken of waterdruppels op het spoelbakje leiden tot verkeerde metingen.
- In de standaardversie stoort chloride vanaf een concentratie van 1000 mg/L. In de kwikvrije versie is de storing afhankelijk van de chlorideconcentratie en de CZV. Concentraties vanaf 100 mg/L chloride kunnen hier tot aanzienlijke verstoringen leiden.

Validatie van de methodes

Aantoonbaarheidsgrens	3.2 mg/L
Bepaalbaarheidsgrens	9.7 mg/L
Einde meetbereik	150 mg/L
Gevoeligheid	-272 mg/L / Abs
Betrouwbaarheidsgrenzen	3.74 mg/L
Standaardafwijking procedure	1.55 mg/L
Variatiecoefficient procedure	2.02 %

Conform

ISO 15705:2002

Overeenkomstig

ISO 15705:2002
DIN 38409 deel 41

[b] reactor vereist voor CSB (150 °C), TOC (120 °C) en totaal -chroom, -fosfaat, -stikstof (100 °C)

CZV MR TT M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
CSB MR/25	25 St.	2420721
CSB MR/25, kwikvrij	25 St.	2420711
CSB MR/150	150 St.	2420726
CSB MR/150, kwikvrij	150 St.	2420716
ValidCheck COD 500 mg/l + TON NN mg/l	1 St.	48371625
ValidCheck WW Influent Multistandaard NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 St.	48399712

De volgende toebehoren zijn eveneens vereist.

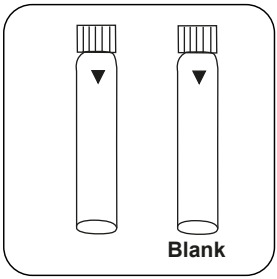
Toebehoren	Verpakkingseenheid	Bestelnr.
Thermoreactor RD 125	1 St.	2418940

Aantekeningen

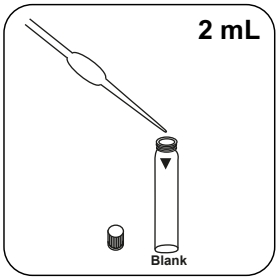
1. Het nulspoelbakje is stabiel bij opslag in het donker. Het nul- en testspoelbakje moeten uit dezelfde partij komen.
2. De spoelbakjes mogen niet warm in de worden geplaatst. De meest stabiele meetwaarden worden bepaald wanneer de spoelbakjes een nacht kunnen blijven staan.
3. Voor monsters met een CZV van minder dan 100 mg/L wordt aanbevolen om de CSB LR-spoelbakjesset te gebruiken indien een hogere nauwkeurigheid gewenst is.

Uitvoering van de bepaling CSB MR met Vario-cuvettentest

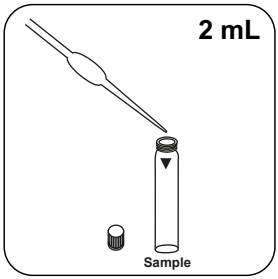
De methode in het apparaat selecteren.



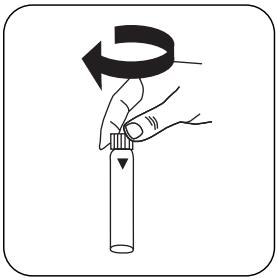
Twee **reagensspoelbakjes** klaarzetten. Een als nulspoelbakje kenmerken.



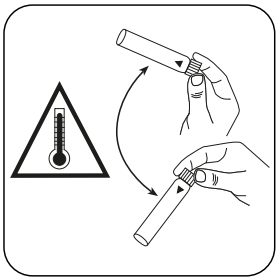
2 mL gedeïoniseerd water in het nulspoelbakje doen.



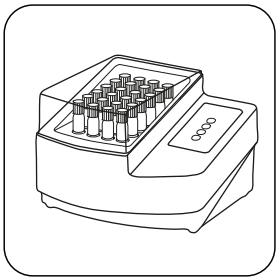
2 mL staal in het staalspoelbakje doen.



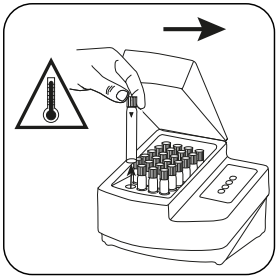
De spoelbakjes afsluiten.



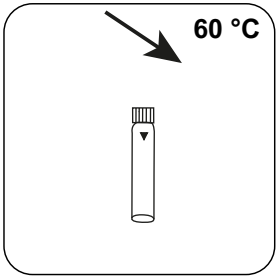
De inhoud mengen door voorzichtig om te draaien. **Opgelet: Warmteontwikkeling!**



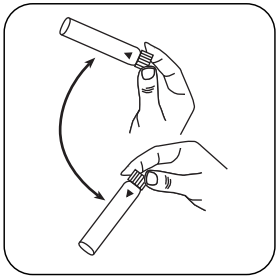
De spoelbakjes in de voorverwarmde thermoreactor gedurende **120 minuten bij 150 °C** ontsluiten.



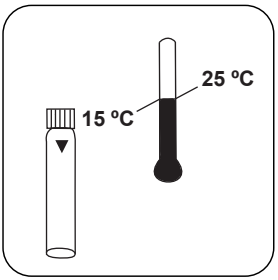
spoelbakje uit de thermoreactor nemen. **(Opgelet: het spoelbakje is heet!)**



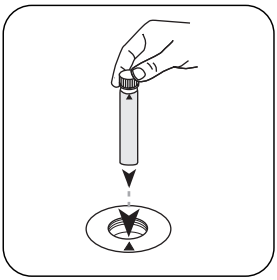
De spoelbakjes laten afkoelen tot ongeveer 60 °C.



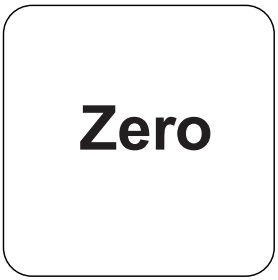
De inhoud mengen door om te draaien.



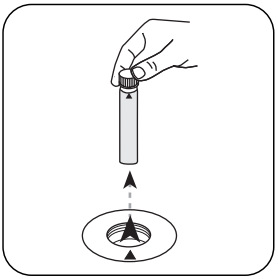
Het spoelbakje eerst laten afkoelen tot kamertemperatuur, dan meten.



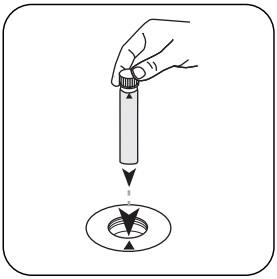
Het **nulspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



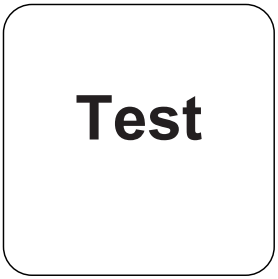
De toets **NUL** indrukken.



Het **spoelbakje** uit de meetschacht nemen.



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



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

De display toont het resultaat in mg/L CSB.

Chemische methode

Dichromate / H_2SO_4

Aanhangsel

Verstoringen

Permanente verstoringen

- In uitzonderlijke gevallen kunnen ingrediënten waarvoor het oxiderend vermogen van het reagens niet voldoende is, tot verminderde resultaten leiden.

Uit te sluiten verstoringen

- Om onjuiste metingen door zwevende deeltjes te voorkomen, is het belangrijk om de spoelbakjes zorgvuldig in de meetschacht te plaatsen, omdat zich door de methode een neerslag vormt op de bodem van de spoelbakjes.
- De buitenwanden van de cuvetten moeten schoon en droog zijn voordat de analyse wordt uitgevoerd. Vingerafdrukken of waterdruppels op het spoelbakje leiden tot verkeerde metingen.
- In de standaardversie stoort chloride vanaf een concentratie van 1000 mg/L. In de kwikvrije versie is de storing afhankelijk van de chlorideconcentratie en de CZV. Concentraties vanaf 100 mg/L chloride kunnen hier tot aanzienlijke verstoringen leiden. Zie methode M130 COD LR TT om hoge chlorideconcentraties in CZV-monsters te verwijderen.

Validatie van de methodes

Aantoonbaarheidsgrens	8.66 mg/L
Bepaalbaarheidsgrens	25.98 mg/L
Einde meetbereik	1500 mg/L
Gevoeligheid	2,141 mg/L / Abs
Betrouwbaarheidsgrenzen	18.82 mg/L
Standaardafwijking procedure	7.78 mg/L
Variatiecoefficient procedure	1.04 %

Conform

ISO 15705:2002

Overeenkomstig

ISO 15705:2002
DIN 38409 deel 43

[b] reactor vereist voor CSB (150 °C), TOC (120 °C) en totaal -chroom, -fosfaat, -stikstof (100 °C)

CZV HR TT M132

200 - 15000 mg/L COD[b)] Hr

Dichromate / H_2SO_4

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
CSB HR/25	25 St.	2420722
CSB HR/25, kwikvrij	25 St.	2420712
CSB HR/150	150 St.	2420727
ValidCheck COD 5000 mg/l + TON NN mg/l	1 St.	48371825

De volgende toebehoren zijn eveneens vereist.

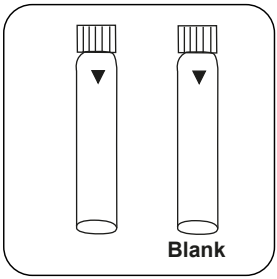
Toebehoren	Verpakkingseenheid	Bestelnr.
Thermoreactor RD 125	1 St.	2418940
Pipet, 200 µl	1 St.	365042
Automatische pipet, 1-5 ml	1 St.	365032

Aantekeningen

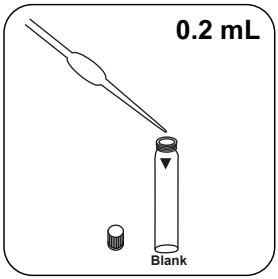
1. Het nulspoelbakje is stabiel bij opslag in het donker. Het nul- en testspoelbakje moeten uit dezelfde partij komen.
2. De spoelbakjes mogen niet warm in de worden geplaatst. De meest stabiele meetwaarden worden bepaald wanneer de spoelbakjes een nacht kunnen blijven staan.
3. Voor monsters met een CZV van minder dan 1 g/L wordt aanbevolen de CSB MR-spoelbakset te gebruiken of, voor monsters van minder dan 0,1 g/L, de CSB LR-spoelbakset indien een hogere nauwkeurigheid vereist is.

Uitvoering van de bepaling CSB HR met Vario-cuvettentest

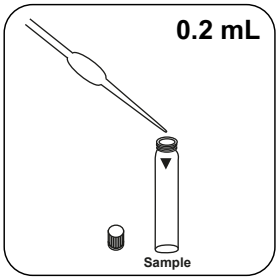
De methode in het apparaat selecteren.



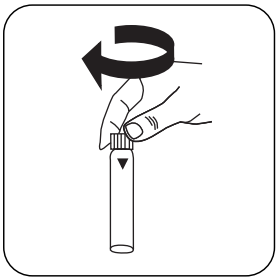
Twee **reagensspoelbakjes** klaarzetten. Een als nulspoelbakje kenmerken.



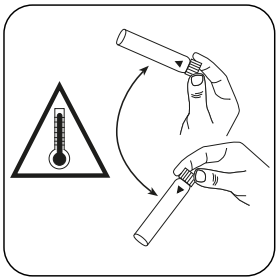
0.2 mL gedeïoniseerd water in het nulspoelbakje doen.



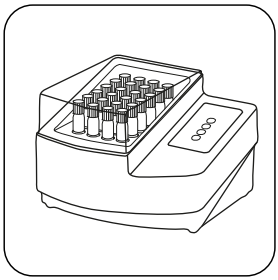
0.2 mL staal in het staalspoelbakje doen.



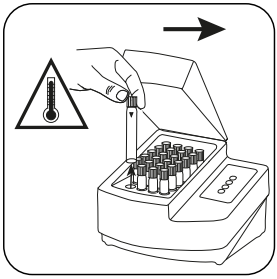
De spoelbakjes afsluiten.



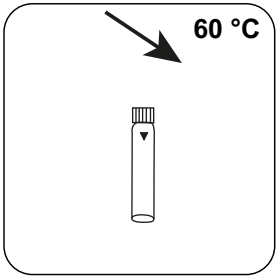
De inhoud mengen door voorzichtig om te draaien. **Opgelet: Warmteontwikkeling!**



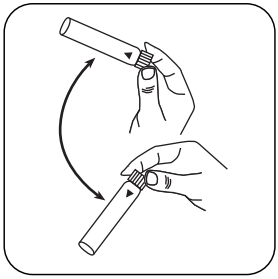
De spoelbakjes in de voorverwarmde thermoreactor gedurende **120 minuten bij 150 °C** ontsluiten.



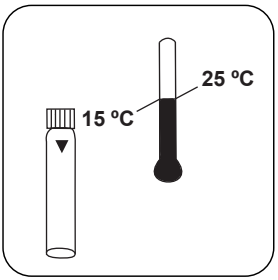
spoelbakje uit de thermoreactor nemen. **(Opgelet: het spoelbakje is heet!)**



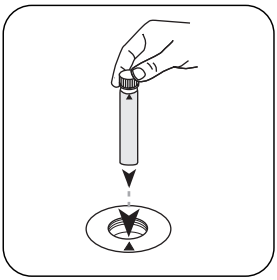
De spoelbakjes laten afkoelen tot ongeveer 60 °C.



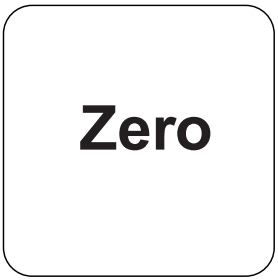
De inhoud mengen door om te draaien.



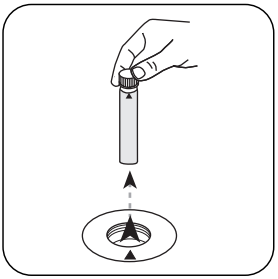
Het spoelbakje eerst laten afkoelen tot kamertemperatuur, dan meten.



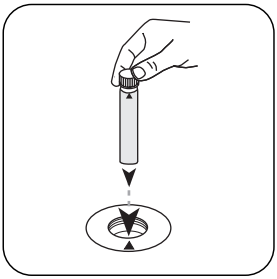
Het **nulspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



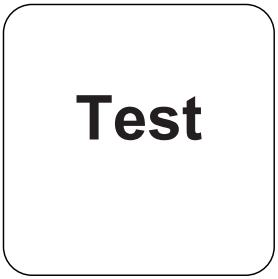
De toets **NUL** indrukken.



Het **spoelbakje** uit de meetschacht nemen.



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



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

De display toont het resultaat in g/L CZV (XD: mg/L CZV).

Chemische methode

Dichromate / H_2SO_4

Aanhangsel

Verstoringen

Permanente verstoringen

- In uitzonderlijke gevallen kunnen ingrediënten waarvoor het oxiderend vermogen van het reagens niet voldoende is, tot verminderde resultaten leiden.

Uit te sluiten verstoringen

- Om onjuiste metingen door zwevende deeltjes te voorkomen, is het belangrijk om de spoelbakjes zorgvuldig in de meetschacht te plaatsen, omdat zich door de methode een neerslag vormt op de bodem van de spoelbakjes.
- De buitenwanden van de cuvetten moeten schoon en droog zijn voordat de analyse wordt uitgevoerd. Vingerafdrukken of waterdruppels op het spoelbakje leiden tot verkeerde metingen.
- In de standaardversie stoort chloride vanaf een concentratie van 10000 mg/L. In de kwikvrije versie is de storing afhankelijk van de chlorideconcentratie en de CZV. Concentraties vanaf 100 mg/L chloride kunnen hier tot aanzienlijke verstoringen leiden. Zie methode M130 COD LR TT om hoge chlorideconcentraties in CZV-monsters te verwijderen.

Validatie van de methodes

Aantoonbaarheidsgrens	112.81 mg/L
Bepaalbaarheidsgrens	338.43 mg/L
Einde meetbereik	15 g/L
Gevoeligheid	21,164 mg/L / Abs
Betrouwbaarheidsgrenzen	70.48 mg/L
Standaardafwijking procedure	27.84 mg/L
Variatiecoefficient procedure	0.37 %

Conform

ISO 15705:2002

Overeenkomstig

ISO 15705:2002

[b] reactor vereist voor CSB (150 °C), TOC (120 °C) en totaal -chroom, -fosfaat, -stikstof (100 °C)

CZV LMR TT **M133**

15 - 300 mg/L COD[b)] **LMr**

Dichromate / H_2SO_4

NL

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
CSB LMR/25	25 St.	2423120
ValidCheck COD 120 mg/l + TON NN mg/l	1 St.	48371425

De volgende toebehoren zijn eveneens vereist.

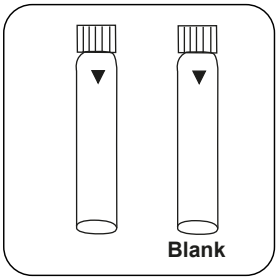
Toebehoren	Verpakkingseenheid	Bestelnr.
Thermoreactor RD 125	1 St.	2418940

Aantekeningen

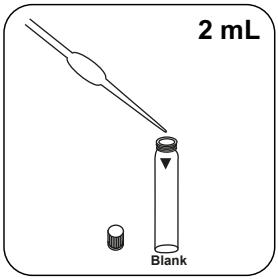
1. Het nulspoelbakje is stabiel bij opslag in het donker. Het nul- en testspoelbakje moeten uit dezelfde partij komen.
2. De spoelbakjes mogen niet warm in de worden geplaatst. De meest stabiele meetwaarden worden bepaald wanneer de spoelbakjes een nacht kunnen blijven staan.

Uitvoering van de bepaling CSB LMR met spoelbakjestest

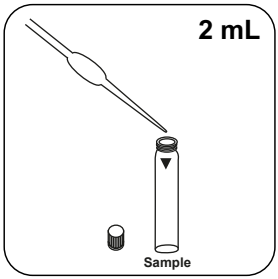
De methode in het apparaat selecteren.



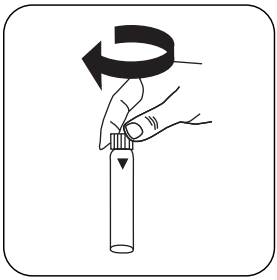
Twee **reagensspoelbakjes** klaarzetten. Een als nulspoelbakje kenmerken.



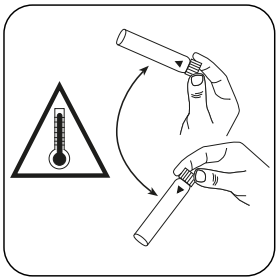
2 mL gedeïoniseerd water in het nulspoelbakje doen.



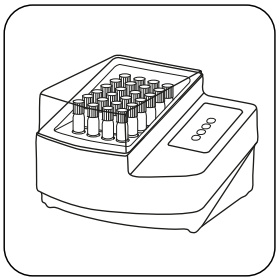
2 mL staal in het staalspoelbakje doen.



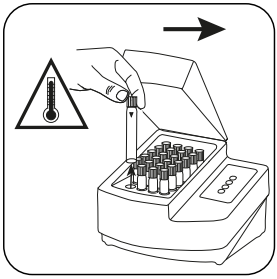
De spoelbakjes afsluiten.



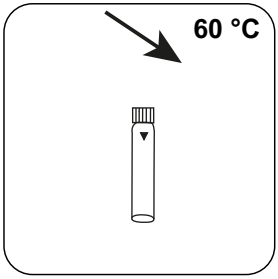
De inhoud mengen door voorzichtig om te draaien. **Opgelet: Warmteontwikkeling!**



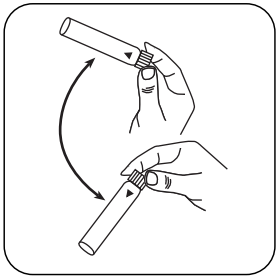
De spoelbakjes in de voorverwarmde thermoreactor gedurende **120 minuten bij 150 °C** ontsluiten.



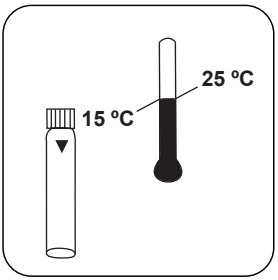
spoelbakje uit de thermoreactor nemen. **(Opgelet: het spoelbakje is heet!)**



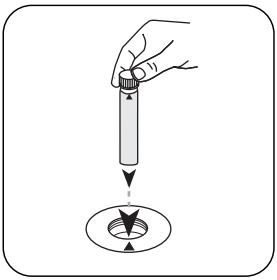
De spoelbakjes laten afkoelen tot ongeveer 60 °C.



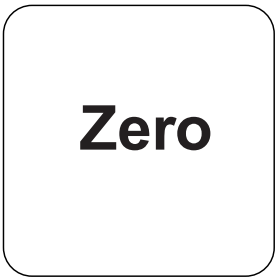
De inhoud mengen door om te draaien.



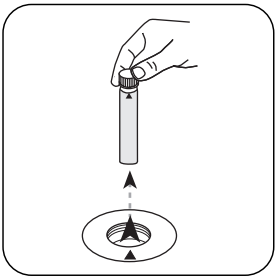
Het spoelbakje eerst laten afkoelen tot kamertemperatuur, dan meten.



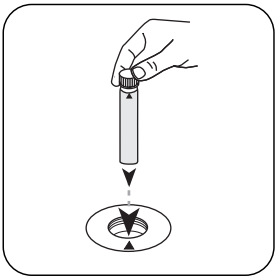
Het **nulspoelbakje** in de meetschacht plaatsen. Op de positionering letten.



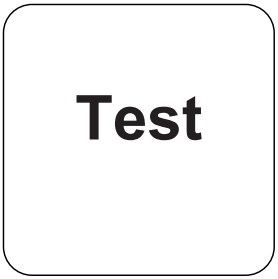
De toets **NUL** indrukken.



Het **spoelbakje** uit de meetschacht nemen.



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



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

De display toont het resultaat in mg/L CSB.

Chemische methode

Dichromate / H_2SO_4

Aanhangsel

Verstoringen

Permanente verstoringen

- In uitzonderlijke gevallen kunnen ingrediënten waarvoor het oxiderend vermogen van het reagens niet voldoende is, tot verminderde resultaten leiden.

Uit te sluiten verstoringen

- Om onjuiste metingen door zwevende deeltjes te voorkomen, is het belangrijk om de spoelbakjes zorgvuldig in de meetschacht te plaatsen, omdat zich door de methode een neerslag vormt op de bodem van de spoelbakjes.
- De buitenwanden van de cuvetten moeten schoon en droog zijn voordat de analyse wordt uitgevoerd. Vingerafdrukken of waterdruppels op het spoelbakje leiden tot verkeerde metingen.
- In de standaardversie stoort chloride vanaf een concentratie van 1000 mg/L. In de kwikvrije versie is de storing afhankelijk van de chlorideconcentratie en de CZV. Concentraties vanaf 100 mg/L chloride kunnen hier tot aanzienlijke verstoringen leiden. Zie methode M130 COD LR TT om hoge chlorideconcentraties in CZV-monsters te verwijderen.

Validatie van de methodes

Aantoonbaarheidsgrens	5.7 mg/L
Bepaalbaarheidsgrens	17.2 mg/L
Einde meetbereik	300 mg/L
Gevoeligheid	-244 mg/L / Abs
Betrouwbaarheidsgrenzen	2.56 mg/L
Standaardafwijking procedure	1.06 mg/L
Variatiecoefficient procedure	0.67 %

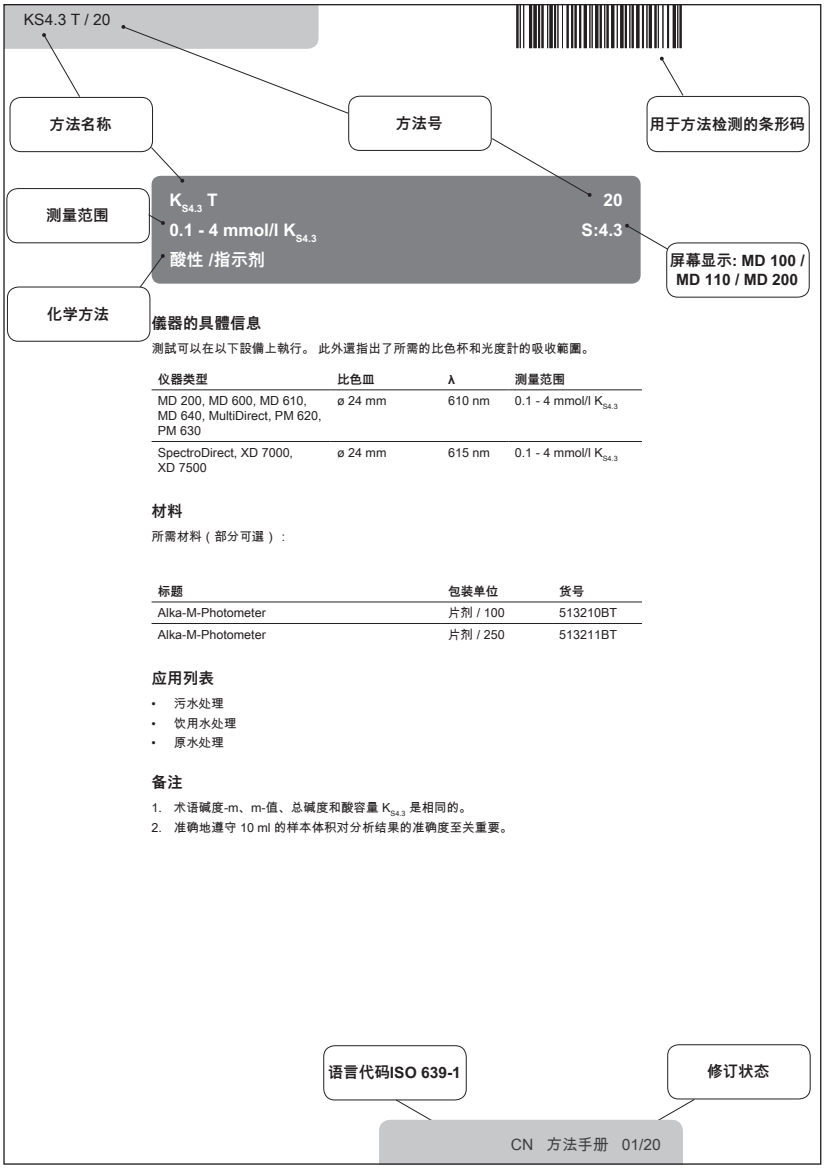
Conform

ISO 15705:2002

Overeenkomstig

ISO 15705:2002
DIN 38409 deel 41

[b] reactor vereist voor CSB (150 °C), TOC (120 °C) en totaal -chroom, -fosfaat, -stikstof (100 °C)



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。

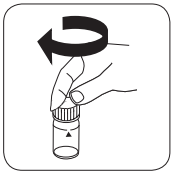
开始测量

进行测定 $K_{S4.3}$ 片剂酸容量

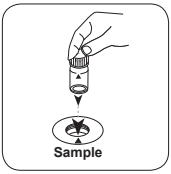
选择设备中的方法。

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。

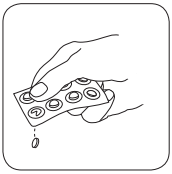


密封比色杯。

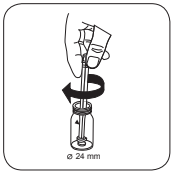


将样本比色杯放入测量轴中。注意定位。

• • •



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

LR TT 化学需氧量 M130

3 - 150 mg/L COD[b)] Lr

Dichromate / H_2SO_4

材料
所需材料（部分可選）：

ZH

试剂	包装单位	货号
COD LR/25	25 片	2420720
CSB LR/25，无汞	25 片	2420710
COD LR/150	150 片	2420725
ValidCheck COD 40 mg/L + TOC 16 mg/L	1 片	48371225
Validchek COD 120 mg/l + TON NN mg/l	1 片	48371425
ValidCheck WW 流出物多参数标准液 NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 片	48399612

它還需要以下配件。

附件	包装单位	货号
热反应器 RD 125	1 片	2418940

备注

1. 储存在黑暗中的空白比色杯是稳定的。
2. 空白比色杯和测试比色杯必须来自同一批次。
3. 热的比色杯不能放入比色杯轴中。当比色杯放置过夜时，确定最稳定的测量值。

去除COD样品中的高浓度氯化物。

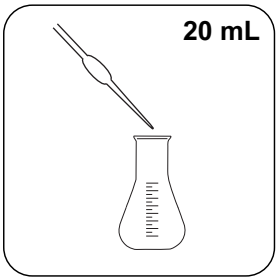
如果氯化物含量超过了所使用的试验的容许量，在进行COD测定时可能会出现干扰。为避免这一问题，应进行以下样品预处理。**配件。**

- 2个300毫升的埃伦迈尔烧瓶，带NS 29/32接口。
- 2 符合DIN 38409标准的HCl吸收器。
- 2个带NS 29/32的玻璃塞子
- 20毫升和25毫升的移液器
- 磁力搅拌器和磁力搅拌棒。
- 温度计(测量范围：0-100℃)
- 冰浴

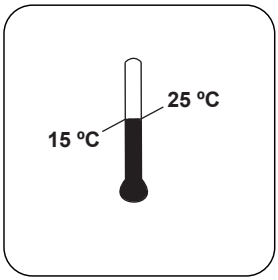
试剂：

- 12 - 14碱石灰 $CaHNaO_2$ soda lemon
- 50毫升H_2SO_4（95-97%，1.84克/毫升，不含COD）。
- 10%盐酸，用于清洗吸收剂中的石灰残留物。

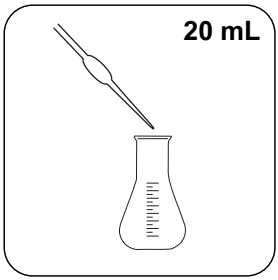
工作必须在通风橱下进行!



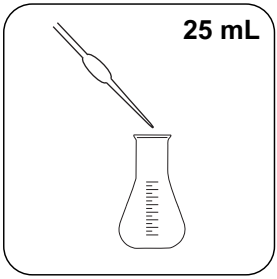
向第一个erlenmeyer烧瓶加入 **20 mL** 样本。



加入磁子搅拌，置于冰水浴，冷却到室温。

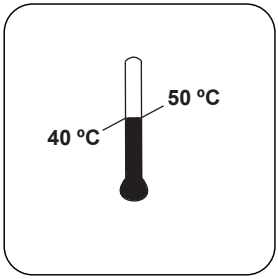


向第二个erlenmeyer烧瓶加入 **20 mL** 去离子水

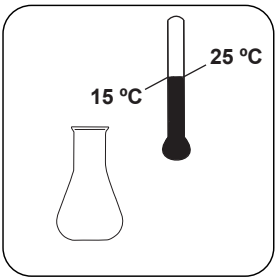


在冰水浴搅拌状态下，向两个erlenmeyer烧瓶分别慢慢加入 **25 mL 浓硫酸** 。

混合液会发烫！

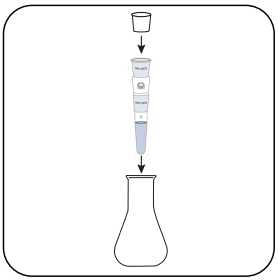


混合液温度不能超过40-50 ℃。

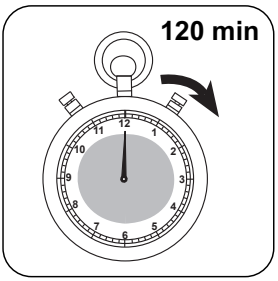


完全添加完毕浓硫酸后，等待样品在冰水浴中冷却到室温 15-25 ℃。

在吸收管中加入 **6 - 7 g 碱石灰** 。



塞住吸收管，固定在 erlenmeyer 烧瓶中。

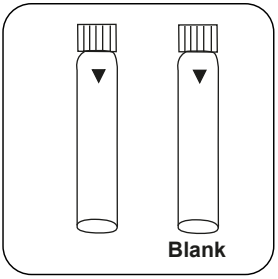


室温下搅拌
120 分钟 ，转速约
250 rpm。（可能产生浊度）

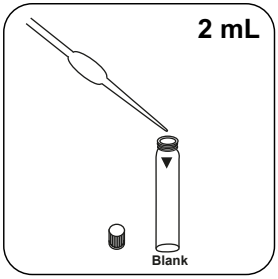
使用此样品进行COD分析。这种预处理将原样品稀释了2.05倍。
$COD_{样品}=COD_{显示值}\times 2.05$

进行测定 Vario 比色杯测试 LR 化学需氧量

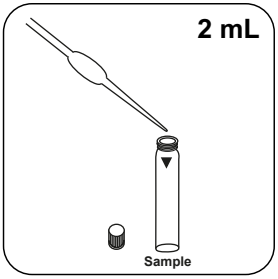
选择设备中的方法。



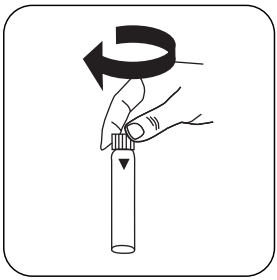
准备两个**试剂比色杯**。将一个比色杯标记为空白比色杯。



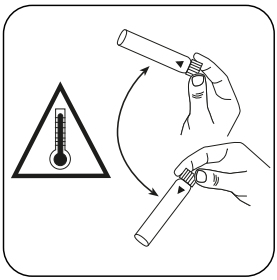
加入 **2 mL 去离子水**到比色杯中。



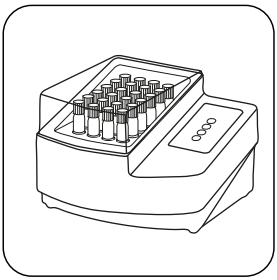
加入 **2 mL 样本**到样本比色杯中。



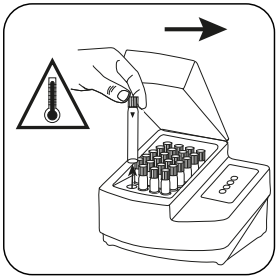
密封比色杯。



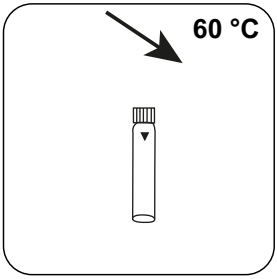
小心旋转混合内容物。**注意：变热！**



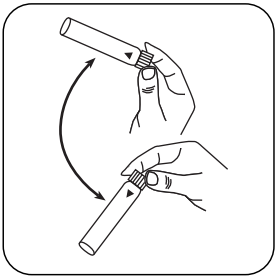
在预热的热反应器中，在 **150°C** 下密封比色杯 **120 分钟** 。



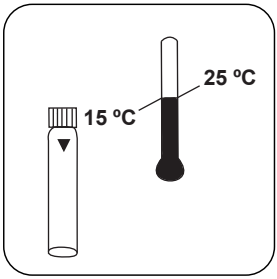
从热反应器上取下比色杯。**（注意：比色杯是热的！）**



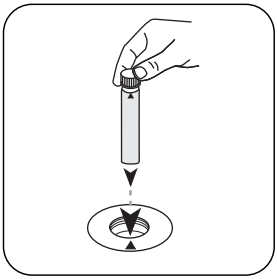
将比色杯冷却到 60 °C。



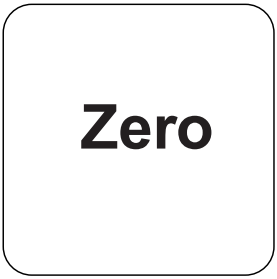
通过旋转混合内容物。



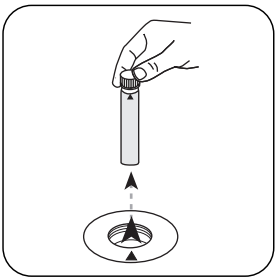
将比色杯冷却到室温，之后测量。



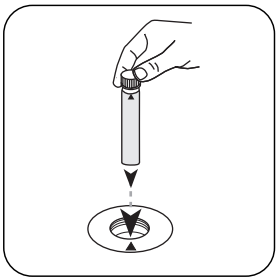
将**空白比色杯**放入测量轴中。注意定位。



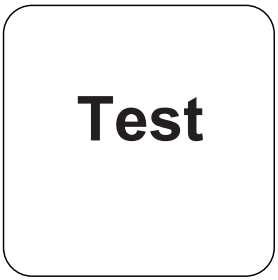
按下 **ZERO** 按钮。



从测量轴上取下**比色杯**。



将**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 化学需氧量。

化学方法

Dichromate / H_2SO_4

附錄

干扰说明

持续干扰

- 在特殊情况下，试剂氧化能力不足会导致较低的结果。

可消除干扰

- 为了防止悬浮物质的错误测量，小心地将比色杯放入测量轴中是重要的，因为该方法会在比色杯的底部形成沉淀物。
- 进行分析前，比色杯的外壁必须干净且干燥。比色杯上的指纹或水滴导致测量错误。
- 在标准版本中，氯化物会干扰1000 mg / l的浓度。 在无汞版本中，干扰取决于氯化物浓度和COD。 100 mg / l氯化物的浓度可能会导致严重干扰。

方法验证

检出限	3.2 mg/L
测定下限	9.7 mg/L
测量上限	150 mg/L
灵敏度	-272 mg/L / Abs
置信范围	3.74 mg/L
标准偏差	1.55 mg/L
变异系数	2.02 %

一致性

ISO 15705:2002

参照

ISO 15705:2002
DIN 38409, 第 41 部分

[b] 消解器对于以下分析是必须的：COD (150 °C), TOC (120 °C) 总铬，总磷，总氮 (100 °C)

MR TT 化学需氧量 M131

20 - 1500 mg/L COD[b)] Mr

Dichromate / H_2SO_4

材料
所需材料（部分可選）：

ZH

试剂	包装单位	货号
COD MR/25	25 片	2420721
CSB MR/25，无汞	25 片	2420711
COD MR/150	150 片	2420726
CSB MR/150，无汞	150 片	2420716
Validchek COD 500 mg/l + TON NN mg/l	1 片	48371625
ValidCheck WW 流入物多参数标准液 NH4-N/COD/TOC/NO3-N/PO4-P/TP	1 片	48399712

它還需要以下配件。

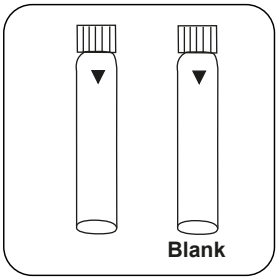
附件	包装单位	货号
热反应器 RD 125	1 片	2418940

备注

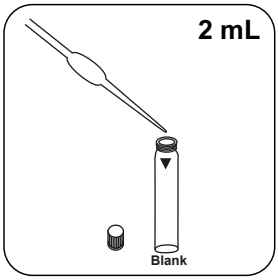
1. 储存在黑暗中的空白比色杯是稳定的。空白比色杯和测试比色杯必须来自同一批次。
2. 热的比色杯不能放入比色杯轴中。当比色杯放置过夜时，确定最稳定的测量值。
3. 对于化学需氧量小于 100 mg/L 的样本，如果需要更高的准确度，建议使用 LR 化学需氧量比色杯组。

进行测定 Vario 比色杯测试 MR 化学需氧量

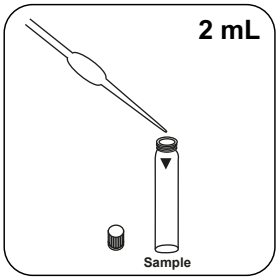
选择设备中的方法。



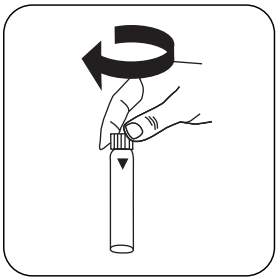
准备两个**试剂比色杯**。将一个比色杯标记为空白比色杯。



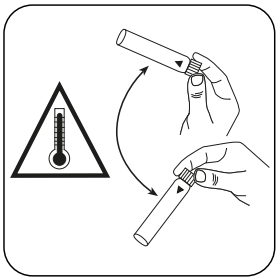
加入 **2 mL 去离子水**到比色杯中。



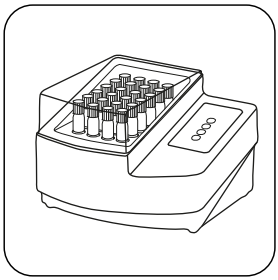
加入 **2 mL 样本**到样本比色杯中。



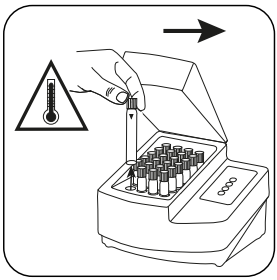
密封比色杯。



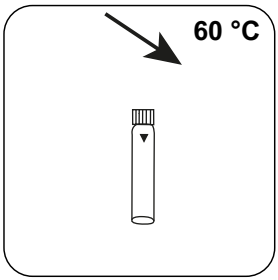
小心旋转混合内容物。**注意：变热！**



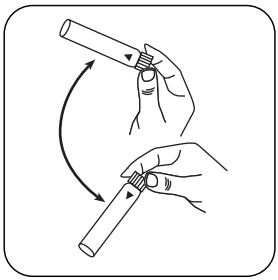
在预热的热反应器中，在 **150°C 下密封比色杯 120 分钟** 。



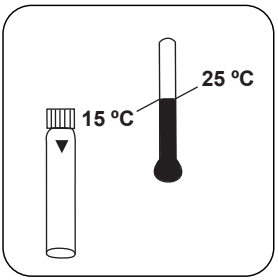
从热反应器上取下比色杯。**（注意：比色杯是热的！）**



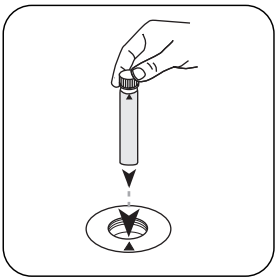
将比色杯冷却到 60 °C。



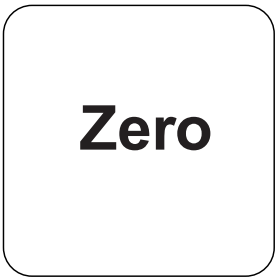
通过旋转混合内容物。



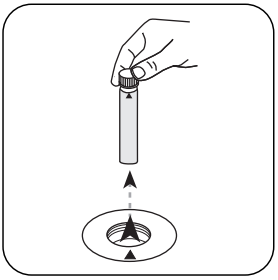
将比色杯冷却到室温，之后测量。



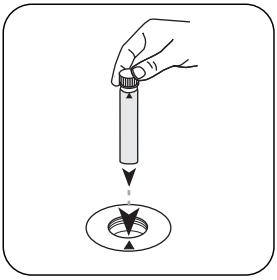
将**空白比色杯**放入测量轴中。注意定位。



按下 **ZERO** 按钮。



从测量轴上取下**比色杯**。



将**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 化学需氧量。

化学方法

Dichromate / H_2SO_4

附錄

干扰说明

持续干扰

- 在特殊情况下，试剂氧化能力不足会导致较低的结果。

可消除干扰

- 为了防止悬浮物质的错误测量，小心地将比色杯放入测量轴中是重要的，因为该方法会在比色杯的底部形成沉淀物。
- 进行分析前，比色杯的外壁必须干净且干燥。比色杯上的指纹或水滴导致测量错误。
- 在标准版本中，氯化物会干扰1000 mg / l的浓度。 在无汞版本中，干扰取决于氯化物浓度和COD。 100 mg / l氯化物的浓度可能会导致严重干扰。 要去除COD样品中的高氯化物浓度，请参见方法M130 COD LR TT。

方法验证

检出限	8.66 mg/L
测定下限	25.98 mg/L
测量上限	1500 mg/L
灵敏度	2,141 mg/L / Abs
置信范围	18.82 mg/L
标准偏差	7.78 mg/L
变异系数	1.04 %

一致性

ISO 15705:2002

参照

ISO 15705:2002
DIN 38409, 第 43 部分

[b] 消解器对于以下分析是必须的：COD (150 °C), TOC (120 °C) 总铬，总磷，总氮 (100 °C)

HR TT 化学需氧量 M132

200 - 15000 mg/L COD[b] Hr

Dichromate / H_2SO_4

材料
所需材料（部分可選）：

ZH

试剂	包装单位	货号
COD HR/25	25 片	2420722
COD HR/25，无汞	25 片	2420712
COD HR/150	150 片	2420727
Validchek COD 5000 mg/l + TON NN mg/l	1 片	48371825

它還需要以下配件。

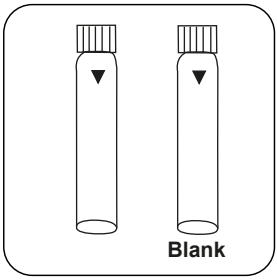
附件	包装单位	货号
热反应器 RD 125	1 片	2418940
自动移液器，200 µl	1 片	365042
自动移液器，1-5 ml	1 片	365032

备注

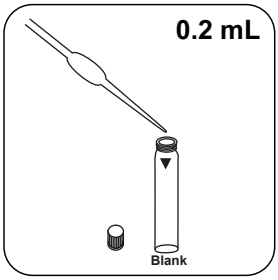
1. 储存在黑暗中的空白比色杯是稳定的。空白比色杯和测试比色杯必须来自同一批次。
2. 热的比色杯不能放入比色杯轴中。当比色杯放置过夜时，确定最稳定的测量值。
3. 对于化学需氧量小于 1 g/L 的样本，建议使用 MR 化学需氧量比色杯组 ，或者对于小于 0.1 g/L 的样本，如果需要更高的准确度，则使用 LR 化学需氧量比色杯组。

进行测定 Vario 比色杯测试 HR 化学需氧量

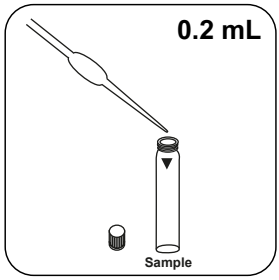
选择设备中的方法。



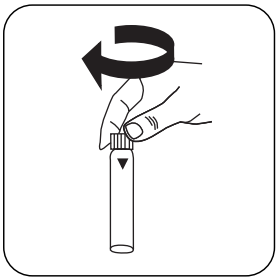
准备两个**试剂比色杯**。将一个比色杯标记为空白比色杯。



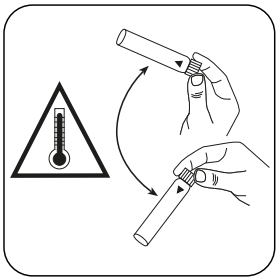
加入 **0.2 mL 去离子水**到比色杯中。



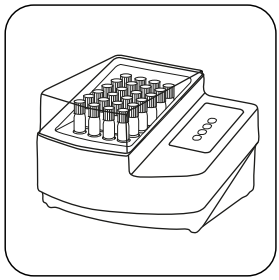
加入 **0.2 mL 样本**到样本比色杯中。



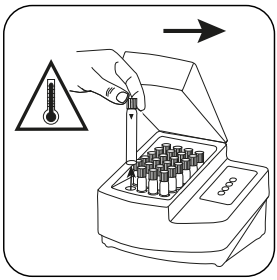
密封比色杯。



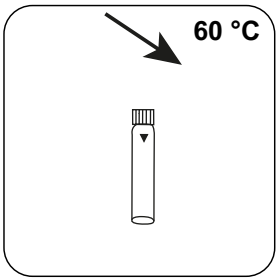
小心旋转混合内容物。**注意：变热！**



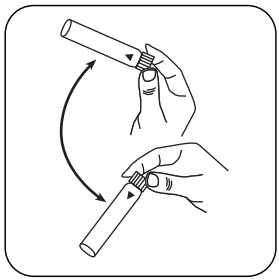
在预热的热反应器中，在 **150°C 下密封比色杯 120 分钟** 。



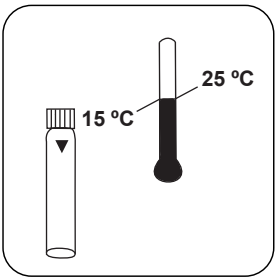
从热反应器上取下比色杯。**（注意：比色杯是热的！）**



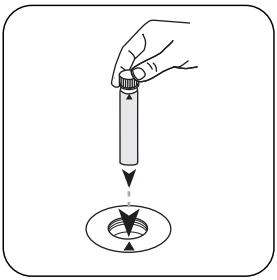
将比色杯冷却到 60 °C。



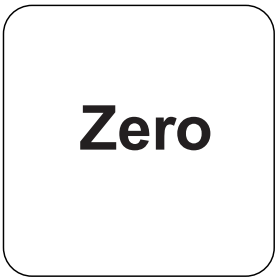
通过旋转混合内容物。



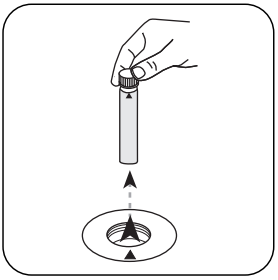
将比色杯冷却到室温，之后测量。



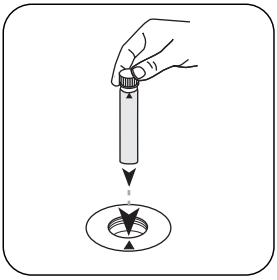
将**空白比色杯**放入测量轴中。注意定位。



按下 **ZERO** 按钮。



从测量轴上取下**比色杯**。



将**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 g/L 化学需氧量 (XD: mg/L 化学需氧量)。

化学方法

Dichromate / H_2SO_4

附錄

干扰说明

持续干扰

- 在特殊情况下，试剂氧化能力不足会导致较低的结果。

可消除干扰

- 为了防止悬浮物质的错误测量，小心地将比色杯放入测量轴中是重要的，因为该方法会在比色杯的底部形成沉淀物。
- 进行分析前，比色杯的外壁必须干净且干燥。比色杯上的指纹或水滴导致测量错误。
- 在标准版本中，氯化物会干扰10000 mg / l的浓度。 在无汞版本中，干扰取决于氯化物浓度和COD。 100 mg / l氯化物的浓度可能会导致严重干扰。 要去除COD样品中的高氯化物浓度，请参见方法M130 COD LR TT。

方法验证

检出限	112.81 mg/L
测定下限	338.43 mg/L
测量上限	15 g/L
灵敏度	21,164 mg/L / Abs
置信范围	70.48 mg/L
标准偏差	27.84 mg/L
变异系数	0.37 %

一致性

ISO 15705:2002

参照

ISO 15705:2002

[b] 消解器对于以下分析是必须的：COD (150 °C), TOC (120 °C) 总铬，总磷，总氮 (100 °C)

LMR TT 化学需氧量 M133

15 - 300 mg/L COD[b] LMr

Dichromate / H_2SO_4

材料
所需材料（部分可選）：

ZH

试剂	包装单位	货号
COD LMR/25	25 片	2423120
Validchek COD 120 mg/l + TON NN mg/l	1 片	48371425

它還需要以下配件。

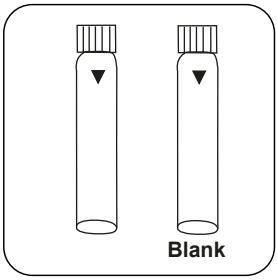
附件	包装单位	货号
热反应器 RD 125	1 片	2418940

备注

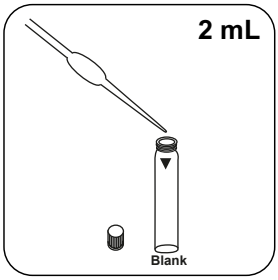
1. 储存在黑暗中的空白比色杯是稳定的。空白比色杯和测试比色杯必须来自同一批次。
2. 热的比色杯不能放入比色杯轴中。当比色杯放置过夜时，确定最稳定的测量值。

进行测定 COD LMR，管状试剂法

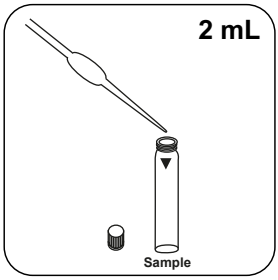
选择设备中的方法。



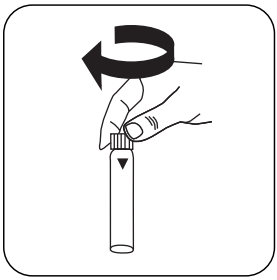
准备两个**试剂比色杯**。将一个比色杯标记为空白比色杯。



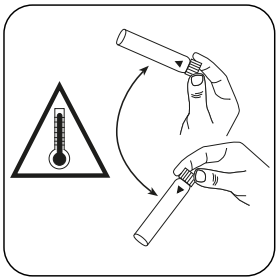
加入 **2 mL 去离子水**到比色杯中。



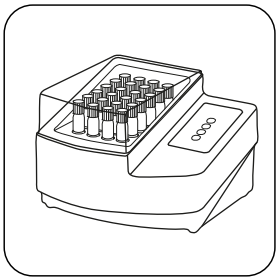
加入 **2 mL 样本**到样本比色杯中。



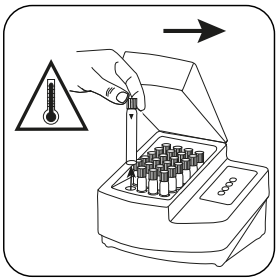
密封比色杯。



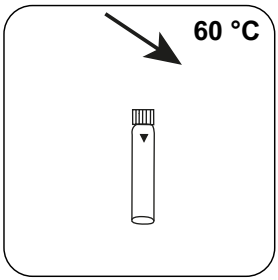
小心旋转混合内容物。**注意：变热！**



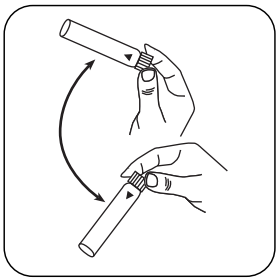
在预热的热反应器中，在 **150°C 下密封比色杯 120 分钟** 。



从热反应器上取下比色杯。**（注意：比色杯是热的！）**

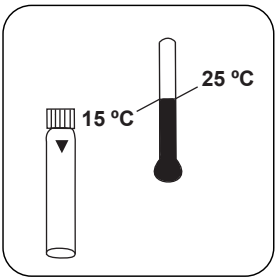


将比色杯冷却到 60 °C。

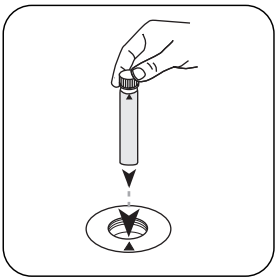


通过旋转混合内容物。

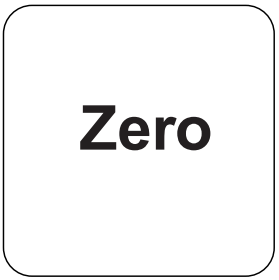
ZH



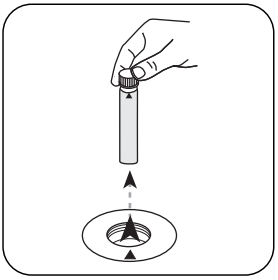
将比色杯冷却到室温，之后测量。



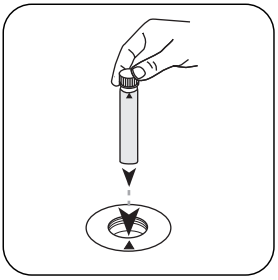
将**空白比色杯**放入测量轴中。注意定位。



按下 **ZERO** 按钮。



从测量轴上取下**比色杯**。



将**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 化学需氧量。

化学方法

Dichromate / H_2SO_4

附錄

干扰说明

持续干扰

- 在特殊情况下，试剂氧化能力不足会导致较低的结果。

可消除干扰

- 为了防止悬浮物质的错误测量，小心地将比色杯放入测量轴中是重要的，因为该方法会在比色杯的底部形成沉淀物。
- 进行分析前，比色杯的外壁必须干净且干燥。比色杯上的指纹或水滴导致测量错误。
- 在标准版本中，氯化物会干扰1000 mg / l的浓度。 在无汞版本中，干扰取决于氯化物浓度和COD。 100 mg / l氯化物的浓度可能会导致严重干扰。 要去除COD样品中的高氯化物浓度，请参见方法M130 COD LR TT。

方法验证

检出限	5.7 mg/L
测定下限	17.2 mg/L
测量上限	300 mg/L
灵敏度	-244 mg/L / Abs
置信范围	2.56 mg/L
标准偏差	1.06 mg/L
变异系数	0.67 %

一致性

ISO 15705:2002

参照

ISO 15705:2002
DIN 38409, 第 41 部分

[b] 消解器对于以下分析是必须的：COD (150 °C), TOC (120 °C) 总铬，总磷，总氮 (100 °C)

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Technical changes without notice
Printed in Germany 09/24
No.: 00386448