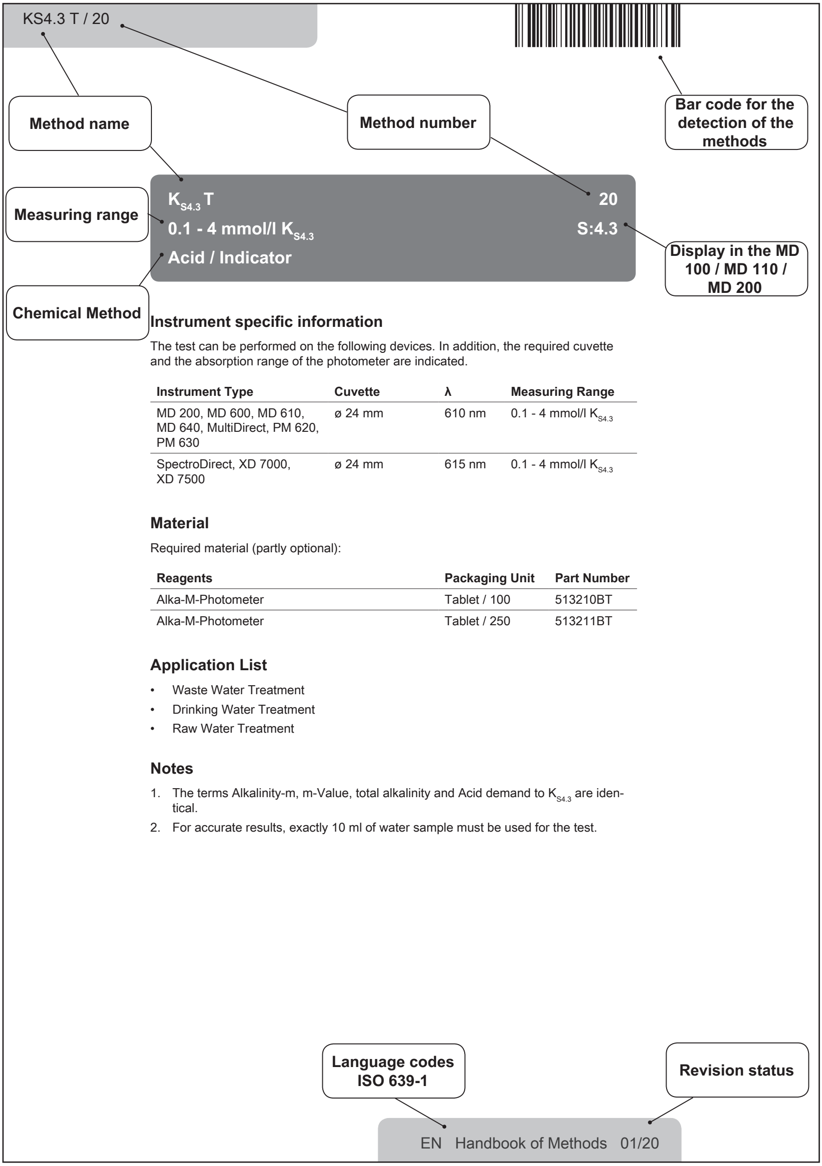
Lovibond® Water Testing

Tintometer® Group

Manual of Methods

MD 100 • MD 110 • MD 200

Iron



KS4.3 T / 20

Method name

Method number

Bar code for the detection of the methods

Measuring range

Display in the MD 100 / MD 110 / MD 200

Chemical Method

$K_{S4.3}$ T **20**

0.1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

Acid / Indicator

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

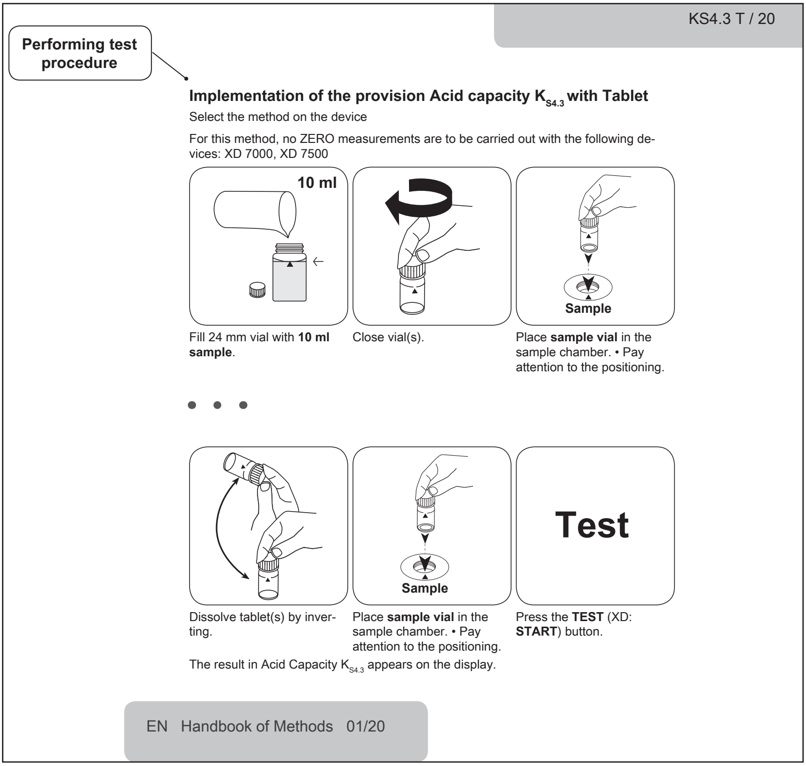
Notes

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.

Language codes ISO 639-1

Revision status

EN Handbook of Methods 01/20



KS4.3 T / 20

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.

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Iron T M220

0.02 - 1 mg/L Fe FE

Ferrozine / Thioglycolate

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Iron II LR (Fe^{2+})	Tablet / 100	515420BT
Iron II LR (Fe^{2+})	Tablet / 250	515421BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablet / 100	515370BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablet / 250	515371BT

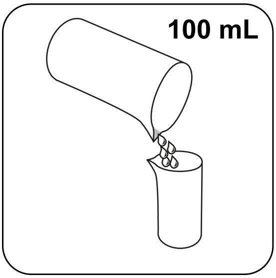
Preparation

1. Water that has been treated with organic compounds such as corrosion inhibitors, must be oxidised where necessary to break down the iron complex. 1 ml of concentrated Sulphuric acid (≥ 95 %) and 1 ml concentrated Nitric acid (≥ 65 %) is therefore added to to 100 ml water sample and boiled down to approximately half the volume. After cooling down, the digestion procedure is continued.

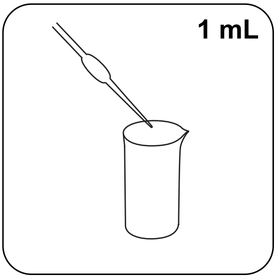
Notes

1. This method is for the determination of total dissolved Fe^{2+} and Fe^{3+}.
2. For the determination of Fe^{2+}, the IRON (II) LR Tablet, instead of the IRON LR Tablet is used.

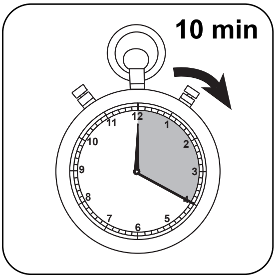
Digestion



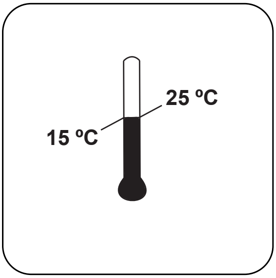
Fill a suitable sample vessel with **100 mL sample** .



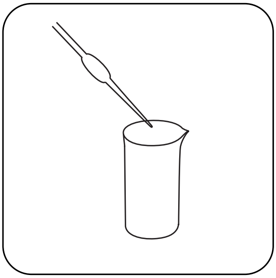
Add **1 mL concentrated sulfuric acid (≥ 95 %)** .



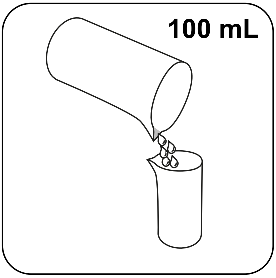
The sample is to be **heated for 10 minutes,** or for as long as it takes for everything to be completely dissolved.



Allow the sample to cool to room temperature.



Adjust **pH-value** of the sample with **ammonia solution (10-25 %) to 3-5**.



Fill the sample with **deionised water to 100 mL** .

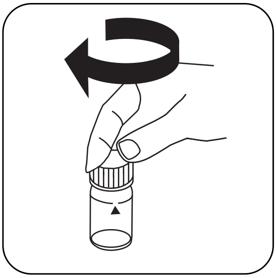
This sample is used for the analysis of total solved and dissolved Iron.

Determination of Iron (II,III), dissolved with Tablet

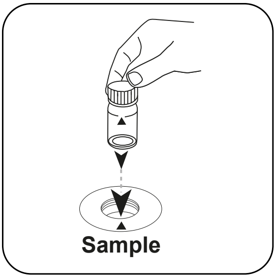
Select the method on the device.

For testing of **dissolved and undissolved Iron,** carry out the described **digestion**.

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



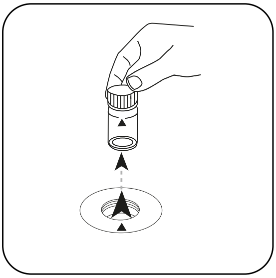
Close vial(s).



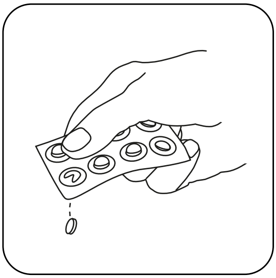
Place **sample vial** in the sample chamber. Pay attention to the positioning.

Zero

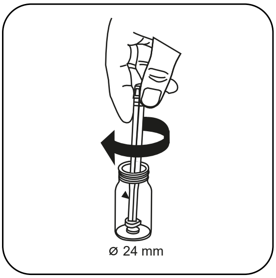
Press the **ZERO** button.



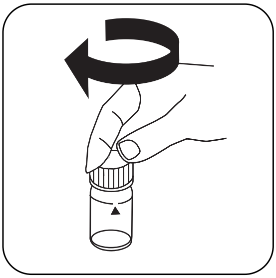
Remove the vial from the sample chamber.



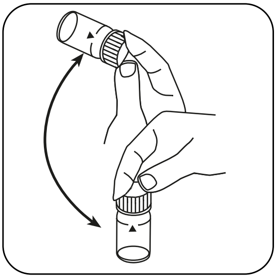
Add **IRON LR tablet**.



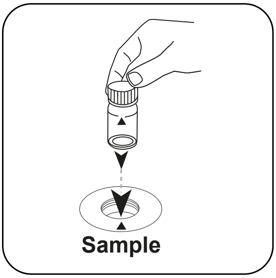
Crush tablet(s) by rotating slightly.



Close vial(s).



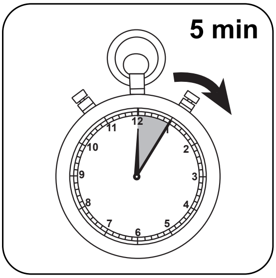
Dissolve tablet(s) by inverting.



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

Test

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



Wait for **5 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

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

Chemical Method

Ferrozine / Thioglycolate

Appendix

Interferences

Removeable Interferences

1. The presence of copper increases the test result by 10 %. At a concentration of 10 mg/L copper in the sample, the measurement result is increased by 1 mg/L iron. The interference can be eliminated by the addition of thiourea

Method Validation

Limit of Detection	0.01 mg/L
Limit of Quantification	0.016 mg/L
End of Measuring Range	1 mg/L
Sensitivity	0.92 mg/L / Abs
Confidence Intervall	0.013 mg/L
Standard Deviation	0.005 mg/L
Variation Coefficient	1.23 %

Bibliography

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, p. 102

Iron PP M222

0.02 - 3 mg/L Fe[g)] FE1

1,10-Phenanthroline

Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Ferro F10	Powder / 100 pc.	530560
VARIO Ferro F10	Powder / 1000 pc.	530563

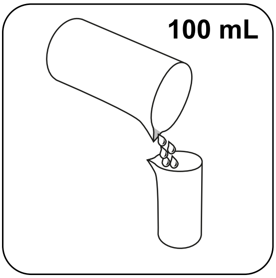
Preparation

1. Iron oxide requires mild, strong or Digesdahl digestion before the analysis (digestion process with acid).
2. Very strong alkaline or acidic water samples should be adjusted to between pH 3 and pH 5 before the analysis.
3. Water samples containing visible rust should be allowed to react for at least five minutes.
4. Water that has been treated with organic compounds such as corrosion inhibitors, must be oxidised where necessary to break down the iron complex. 1 ml of concentrated Sulphuric acid (≥ 95 %) and 1 ml concentrated Nitric acid (≥ 65 %) is therefore added to to 100 ml water sample and boiled down to approximately half the volume. After cooling down, the digestion procedure is continued.

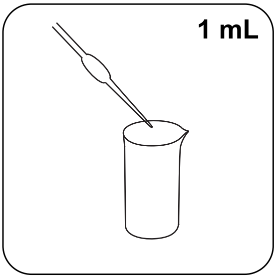
Notes

1. This method is for the determination of all forms of dissolved iron and most forms of undissolved iron.
2. Accuracy is not affected by undissolved powder.

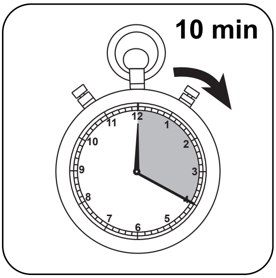
Digestion



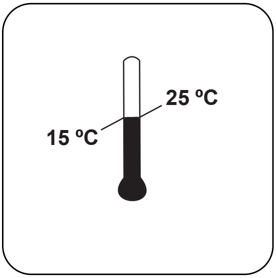
Fill a suitable sample vessel with **100 mL sample** .



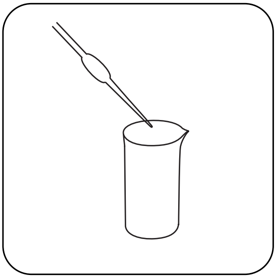
Add **1 mL concentrated sulfuric acid (≥ 95 %)** .



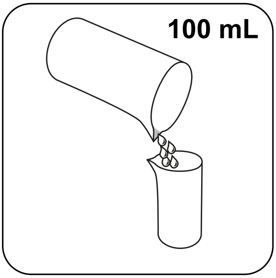
The sample is to be **heated for 10 minutes,** or for as long as it takes for everything to be completely dissolved.



Allow the sample to cool to room temperature.



Adjust **pH-value** of the sample with **ammonia solution (10-25 %) to 3-5**.



Fill the sample with **deionised water to 100 mL** .

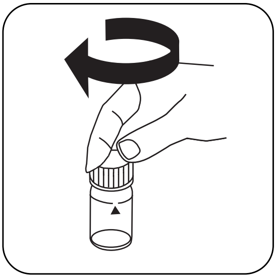
This sample is used for the analysis of total solved and dissolved Iron.

Determination of Iron (II,III), dissolved with Vario Powder Packs

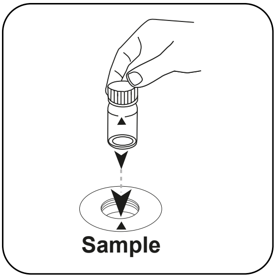
Select the method on the device.

For testing of **Iron with tablet,** carry out the described **digestion**.

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



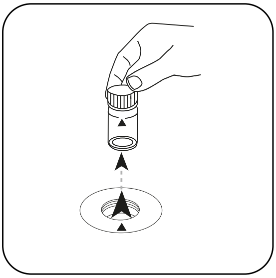
Close vial(s).



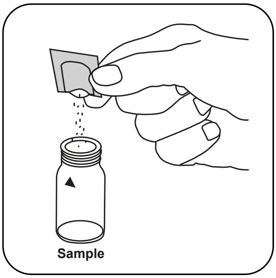
Place **sample vial** in the sample chamber. Pay attention to the positioning.

Zero

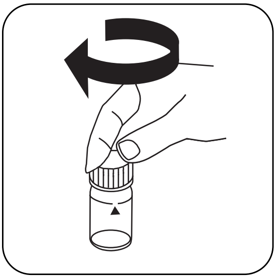
Press the **ZERO** button.



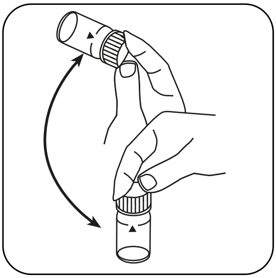
Remove the vial from the sample chamber.



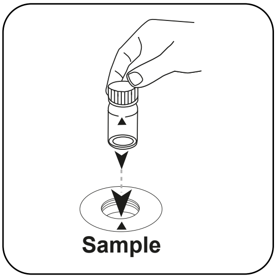
Add **Vario FERRO F10 powder pack**.



Close vial(s).



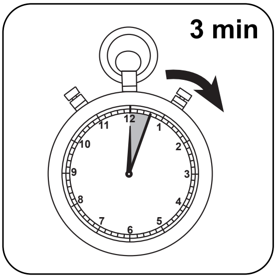
Invert several times to mix the contents.



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

Test

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



Wait for **3 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

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

Chemical Method

1,10-Phenanthroline

Appendix

Interferences

Persistant Interferences

1. Iridium interferes with the test.

According to

DIN 38406-E1
Standard Method 3500-Fe-1997
US EPA 40 CFR 136

[9] Reagent recovers most insoluble iron oxides without digestion

Iron (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Material

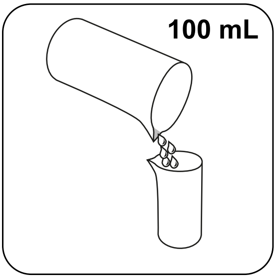
Required material (partly optional):

Reagents	Packaging Unit	Part Number
VARIO Iron TPTZ F10	Powder / 100 pc.	530550

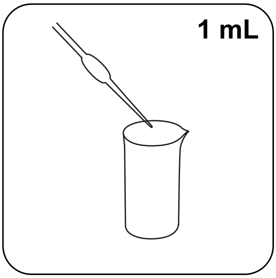
Preparation

1. Digestion is required for the determination of total Iron. The TPTZ reagent recovers most iron oxides without digestion.
2. All glassware must first be rinsed with diluted 1:1 Hydrochloric acid solution before the analysis and then rinsed with deionised water to remove iron deposits that can cause slightly high results.
3. Strong alkaline or acidic water samples should be adjusted between pH 3 and pH 8 before the analysis (use 0.5 mol/l Sulphuric acid or 1 mol/l Sodium hydroxide).
4. Water that has been treated with organic compounds such as corrosion inhibitors, must be oxidised where necessary to break down the iron complex. 1 ml of concentrated Sulphuric acid (≥ 95 %) and 1 ml concentrated Nitric acid (≥ 65 %) is therefore added to to 100 ml water sample and boiled down to approximately half the volume. After cooling down, the digestion procedure is continued.

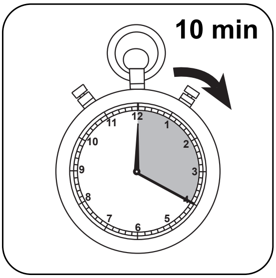
Digestion



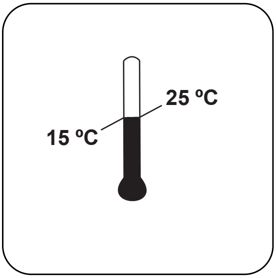
Fill a suitable sample vessel with **100 mL sample** .



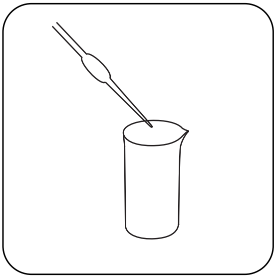
Add **1 mL concentrated sulfuric acid (≥ 95 %)** .



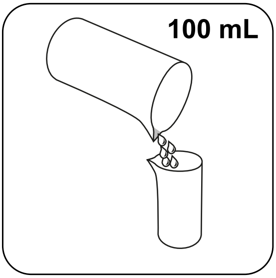
The sample is to be **heated for 10 minutes,** or for as long as it takes for everything to be completely dissolved.



Allow the sample to cool to room temperature.



Adjust **pH-value** of the sample with **ammonia solution (10-25 %) to 3-5**.



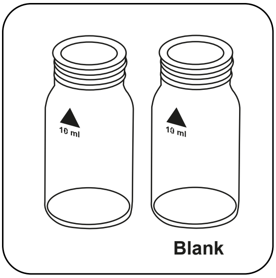
Fill the sample with **deionised water to 100 mL** .

This sample is used for the analysis of total solved and dissolved Iron.

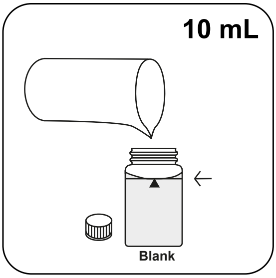
Determination of Iron, total with Vario Powder Pack

Select the method on the device.

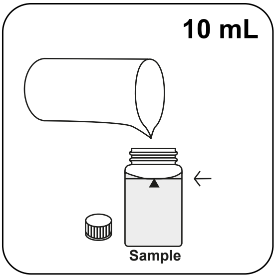
For testing of **total Iron,** carry out the described **digestion**.



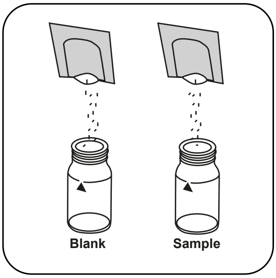
Prepare two clean 24 mm vials. Mark one as a blank.



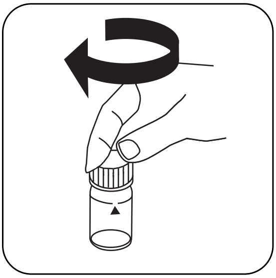
Put **10 mL deionised water** in the blank.



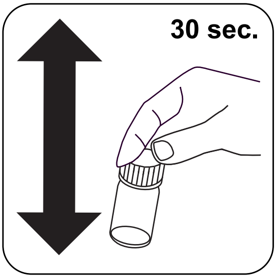
Put **10 mL sample** in the sample vial.



Add **a Vario IRON TPTZ F10 powder pack** in each vial.



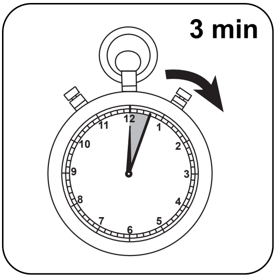
Close vial(s).



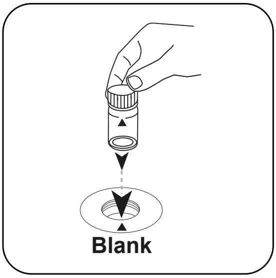
Mix the contents by shaking. (30 sec.).

↵

Press the **ENTER** button.



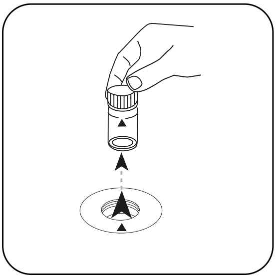
Wait for **3 minute(s) reaction time**.



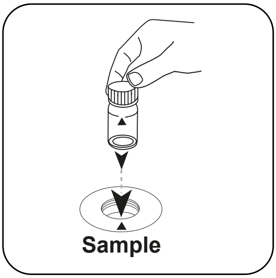
Place **blank** in the sample chamber. Pay attention to the positioning.

Zero

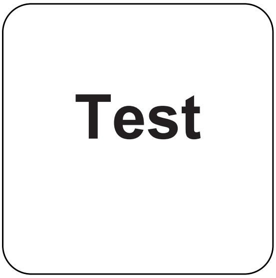
Press the **ZERO** button.



Remove the 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 Iron appears on the display.

Chemical Method

TPTZ

Appendix

Interferences

Persistant Interferences

When interferences occur, colour development is inhibited or a precipitate is formed. The values refer to a standard with an iron concentration of 0.5 mg/L.

Interference	from / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Bibliography

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)

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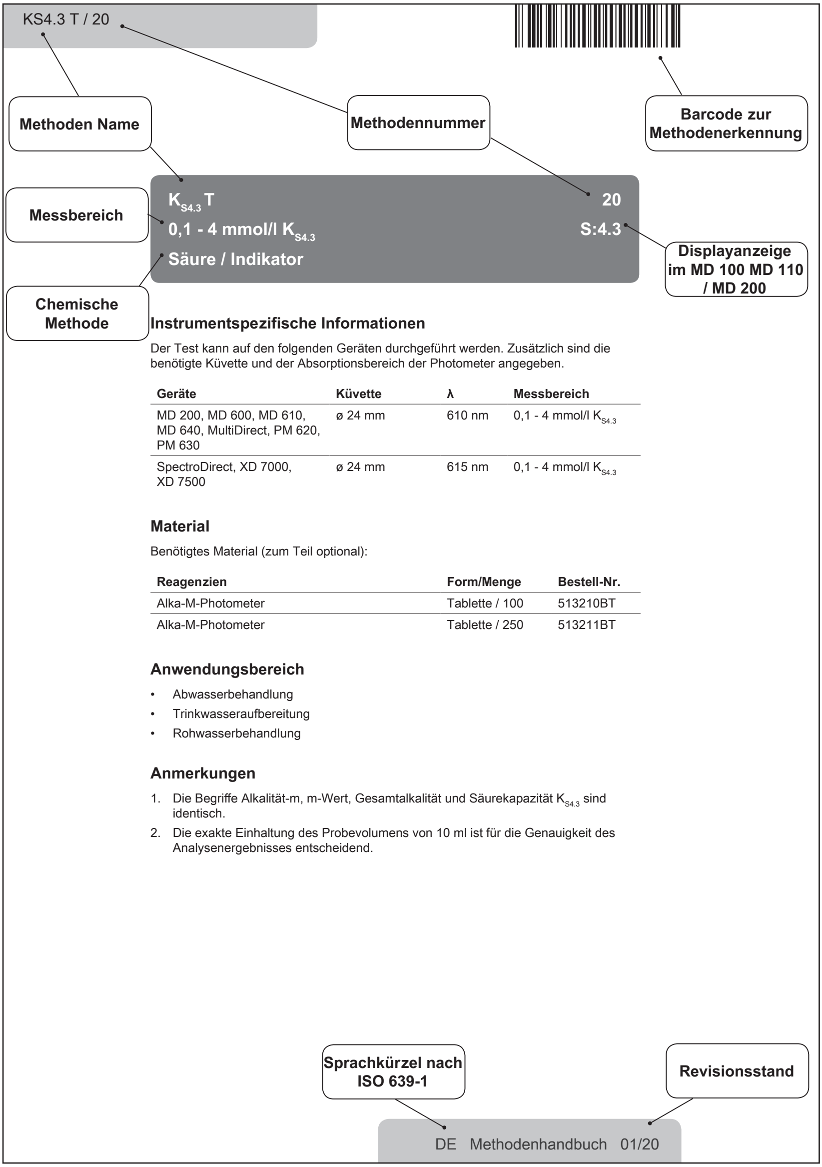


KS4.3 T / 20

$K_{S4.3}$ T **20**

0,1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

Säure / Indikator

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

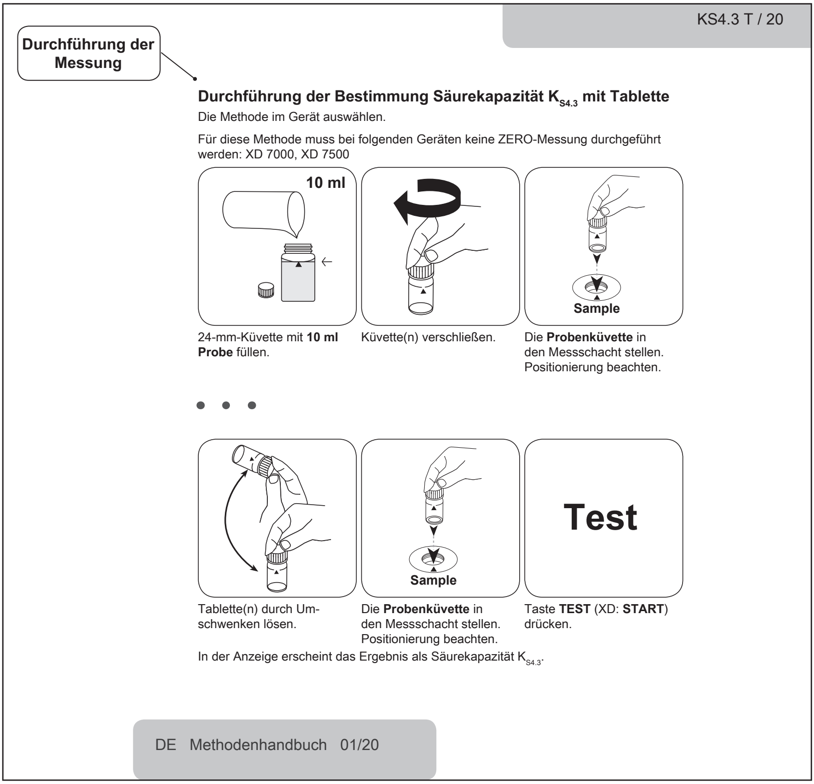
Anwendungsbereich

- 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.

DE Methodenhandbuch 01/20



Durchführung der Messung

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

Die Methode im Gerät auswählen.

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

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

Küvette(n) verschließen.

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

• • •

Tablette(n) durch Umschwenken lösen.

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

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

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

Eisen T M220

0,02 - 1 mg/L Fe FE

Ferrozine / Thioglycolat

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
Iron II LR (Fe^{2+})	Tablette / 100	515420BT
Iron II LR (Fe^{2+})	Tablette / 250	515421BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablette / 100	515370BT
Iron LR (Fe^{2+} und Fe^{3+})	Tablette / 250	515371BT

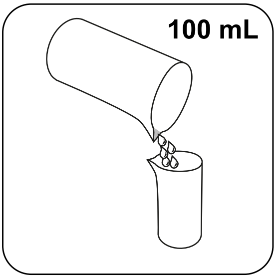
Vorbereitung

1. Wässer, die mit organischen Verbindungen als Korrosionsschutz usw. behandelt worden sind, müssen ggf. oxidiert werden, um die Eisenkomplexe zu zerstören. Dazu wird eine 100 ml Probe mit 1 ml konzentrierter Schwefelsäure (≥ 95 %) und 1 ml konzentrierter Salpetersäure (≥ 65 %) versetzt und auf die Häfte eingedampft. Nach dem Abkühlen wird der Aufschluss durchgeführt.

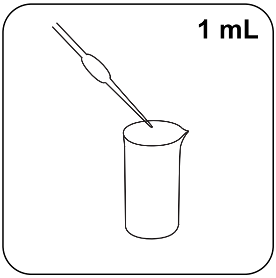
Anmerkungen

1. Bei dieser Methode erfolgt die Bestimmung von gesamt gelösten Fe^{2+} und Fe^{3+}.
2. Zur Bestimmung von Fe^{2+} wird die IRON (II) LR Tablette, anstelle der IRON LR Tablette verwendet.

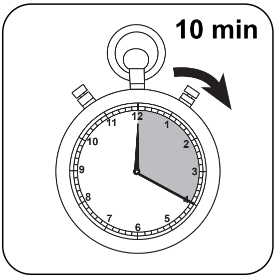
Aufschluss



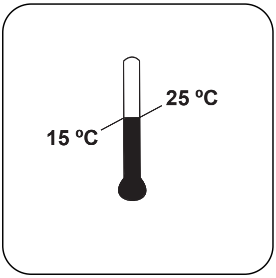
Ein geeignetes Probengefäß mit **100 mL Probe** füllen.



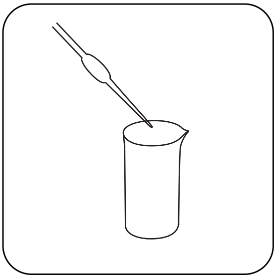
1 mL konzentrierte Schwefelsäure (≥ 95 %) zugeben.



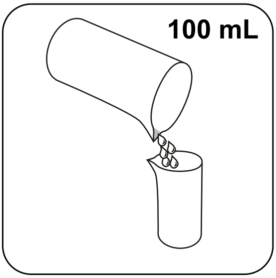
Die Probe für **10 Minuten erhitzen,** oder so lange, bis sich alles vollständig gelöst hat.



Die Probe auf **Raumtemperatur** abkühlen lassen.



Den **pH-Wert** der Probe mit **Ammoniaklösung (10-25 %) auf 3-5** einstellen.



Die Probe mit **VE-Wasser auf 100 mL** auffüllen.

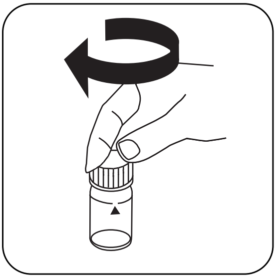
Diese Probe für die Analyse von gesamten gelösten und ungelösten Eisen verwenden.

Durchführung der Bestimmung Eisen(II,III), gelöst mit Tablette

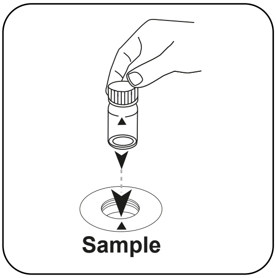
Die Methode im Gerät auswählen.

Für die Bestimmung von **gelöstem und ungelöstem Eisen** den beschriebenen **Aufschluss** durchführen.

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



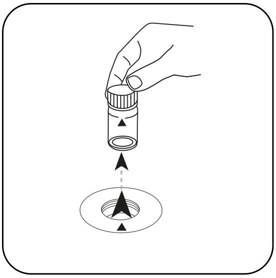
Küvette(n) verschließen.



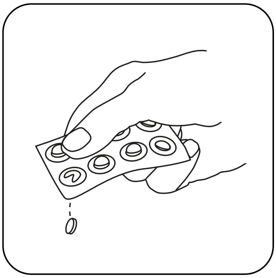
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

Zero

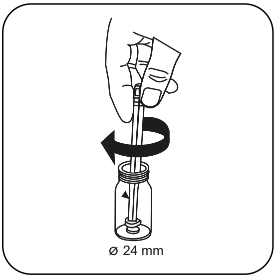
Taste **ZERO** drücken.



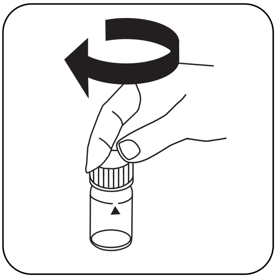
Küvette aus dem Messschacht nehmen.



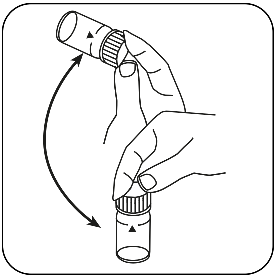
Eine **IRON LR Tablette** zugeben.



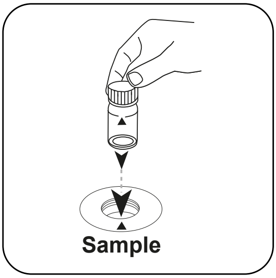
Tablette(n) unter leichter Drehung zerdrücken.



Küvette(n) verschließen.



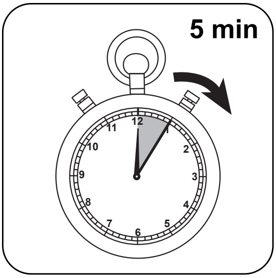
Tablette(n) durch Umschwenken lösen.



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

Test

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



5 Minute(n) Reaktionszeit abwarten.

Nach Ablauf der Reaktionszeit erfolgt automatisch die Messung.

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

Chemische Methode

Ferrozine / Thioglycolat

Appendix

Störungen

Ausschließbare Störungen

1. Die Anwesenheit von Kupfer erhöht das Messergebnis um 10 %. Bei einer Konzentration von 10 mg/L Kupfer in der Probe wird das Messergebnis um 1 mg/L Eisen erhöht.
   Die Störung kann durch die Zugabe von Thioharnstoff beseitigt werden

Methodenvalidierung

Nachweisgrenze	0.01 mg/L
Bestimmungsgrenze	0.016 mg/L
Messbereichsende	1 mg/L
Empfindlichkeit	0.92 mg/L / Abs
Vertrauensbereich	0.013 mg/L
Verfahrensstandardabweichung	0.005 mg/L
Verfahrensvariationskoeffizient	1.23 %

Literaturverweise

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

Eisen PP M222

0,02 - 3 mg/L Fe[g)] FE1

1,10-Phenanthroline

Material

Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
VARIO Ferro F10	Pulver / 100 St.	530560
VARIO Ferro F10	Pulver / 1000 St.	530563

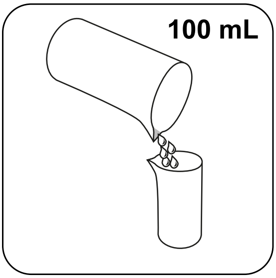
Vorbereitung

1. Eisenoxid erfordert vor der Analyse einen schwachen, starken oder Digesdahl Aufschluss (saures Aufschlussverfahren).
2. Sehr stark alkalische oder saure Wässer sollten vor der Analyse auf einen pH-Wert zwischen 3 und 5 eingestellt werden.
3. Bei Proben die sichtbaren Rost enthalten sollte eine Reaktionszeit von mindestens 5 Minuten eingehalten werden.
4. Wässer, die mit organischen Verbindungen als Korrosionsschutz usw. behandelt worden sind, müssen ggf. oxidiert werden, um die Eisenkomplexe zu zerstören. Dazu wird eine 100 ml Probe mit 1 ml konzentrierter Schwefelsäure (≥ 95 %) und 1 ml konzentrierter Salpetersäure (≥ 65 %) versetzt und auf die Häfte eingedampft. Nach dem Abkühlen wird der Aufschluss durchgeführt.

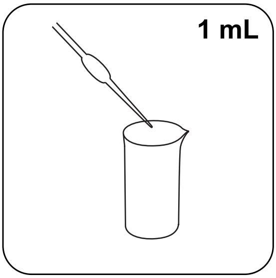
Anmerkungen

1. Bei dieser Methode erfolgt die Bestimmung von allen Formen gelösten Eisens und den meisten Formen von ungelöstem Eisen.
2. Die Genauigkeit wird durch ungelöstes Pulver nicht vermindert.

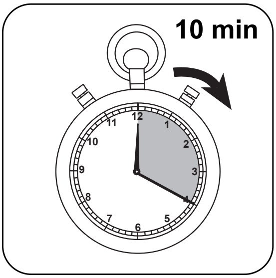
Aufschluss



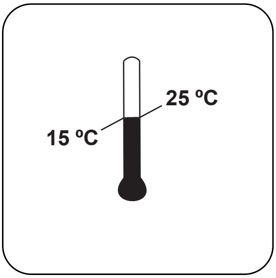
Ein geeignetes Probengefäß mit **100 mL Probe** füllen.



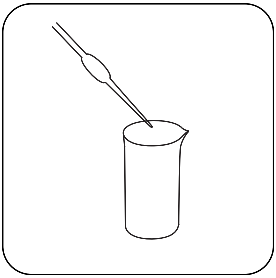
1 mL konzentrierte Schwefelsäure (≥ 95 %) zugeben.



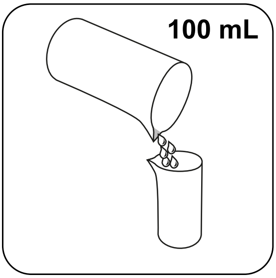
Die Probe für **10 Minuten erhitzen,** oder so lange, bis sich alles vollständig gelöst hat.



Die Probe auf **Raumtemperatur** abkühlen lassen.



Den **pH-Wert** der Probe mit **Ammoniaklösung (10-25 %) auf 3-5** einstellen.



Die Probe mit **VE-Wasser auf 100 mL** auffüllen.

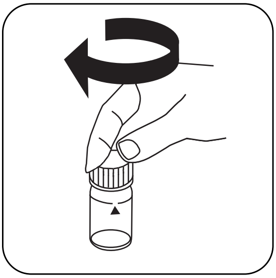
Diese Probe für die Analyse von gesamten gelösten und ungelösten Eisen verwenden.

Durchführung der Bestimmung Eisen(II,III), gelöst mit Vario Pulverpäckchen

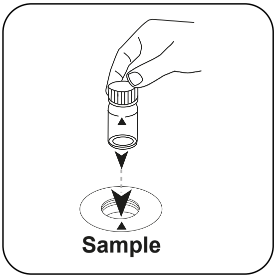
Die Methode im Gerät auswählen.

Für die Bestimmung von **Eisen mit Tablette** den beschriebenen **Aufschluss** durchführen.

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



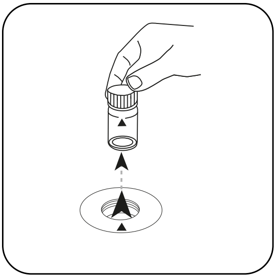
Küvette(n) verschließen.



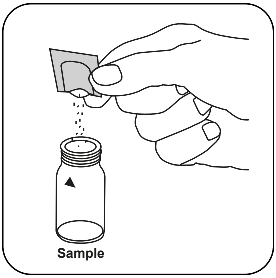
Die **Probenküvette** in den Messschacht stellen. Positionierung beachten.

Zero

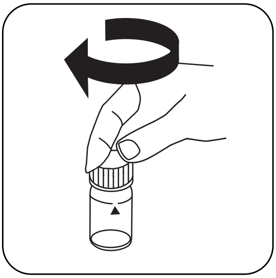
Taste **ZERO** drücken.



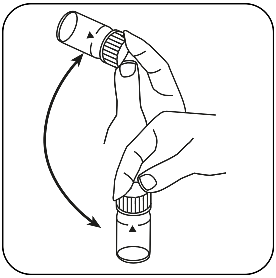
Küvette aus dem Messschacht nehmen.



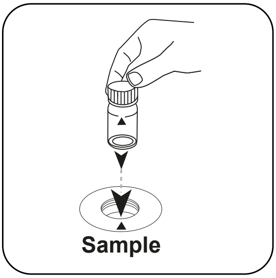
Ein **Vario FERRO F10 Pulverpäckchen** zugeben.



Küvette(n) verschließen.



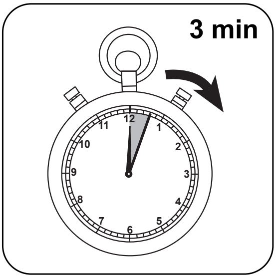
Inhalt durch Umschwenken mischen.



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

Test

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



3 Minute(n) Reaktionszeit abwarten.

Nach Ablauf der Reaktionszeit erfolgt automatisch die Messung.

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

Chemische Methode

1,10-Phenanthroline

Appendix

Störungen

Permanente Störungen

1. Iridium stört die Bestimmung.

Gemäß

DIN 38406-E1
Standard Method 3500-Fe-1997
US EPA 40 CFR 136

[9] Reagenz erfasst die meisten Eisenoxide

Eisen (TPTZ) PP M223

0,02 - 1,8 mg/L Fe FE2

TPTZ

Material

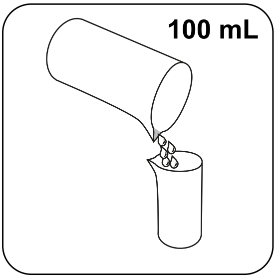
Benötigtes Material (zum Teil optional):

Reagenzien	Form/Menge	Bestell-Nr.
VARIO Iron TPTZ F10	Pulver / 100 St.	530550

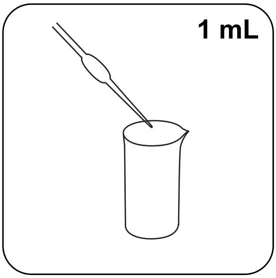
Vorbereitung

1. Für die Bestimmung von Gesamteisen ist ein Aufschluss erforderlich. Das TPTZ Reagenz erfasst die meisten Eisenoxide ohne Aufschluss.
2. Sämtliche Laborgläser vor der Analyse mit verdünnter Salzsäurelösung (1:1) und anschließend mit VE-Wasser spülen, um Eisenablagerungen zu beseitigen, die zu geringfügig höheren Ergebnissen führen können.
3. Stark alkalische oder saure Wässer sollten vor der Analyse in einen pH-Bereich zwischen 3 und 8 gebracht werden (mit 0,5 mol/l Schwefelsäure bzw. 1 mol/l Natronlauge).
4. Wässer, die mit organischen Verbindungen als Korrosionsschutz usw. behandelt worden sind, müssen ggf. oxidiert werden, um die Eisenkomplexe zu zerstören. Dazu wird eine 100 ml Probe mit 1 ml konzentrierter Schwefelsäure (≥ 95 %) und 1 ml konzentrierter Salpetersäure (≥ 65 %) versetzt und auf die Häfte eingedampft. Nach dem Abkühlen wird der Aufschluss durchgeführt.

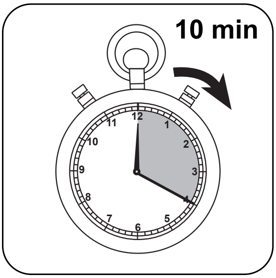
Aufschluss



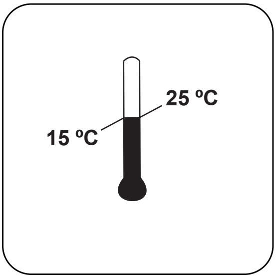
Ein geeignetes Probengefäß mit **100 mL Probe** füllen.



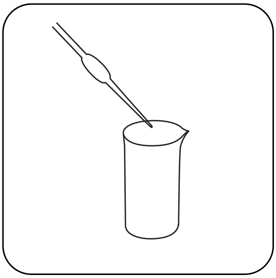
1 mL konzentrierte Schwefelsäure (≥ 95 %) zugeben.



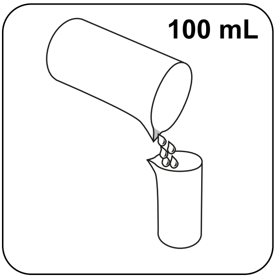
Die Probe für **10 Minuten erhitzen,** oder so lange, bis sich alles vollständig gelöst hat.



Die Probe auf **Raumtemperatur** abkühlen lassen.



Den **pH-Wert** der Probe mit **Ammoniaklösung (10-25 %) auf 3-5** einstellen.



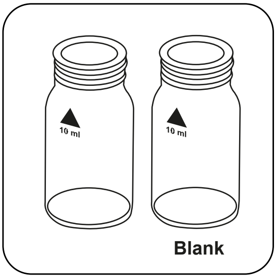
Die Probe mit **VE-Wasser auf 100 mL** auffüllen.

Diese Probe für die Analyse von gesamten gelösten und ungelösten Eisen verwenden.

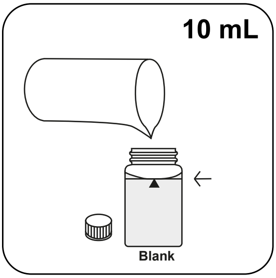
Durchführung der Bestimmung Eisen, gesamt mit Vario Pulverpäckchen

Die Methode im Gerät auswählen.

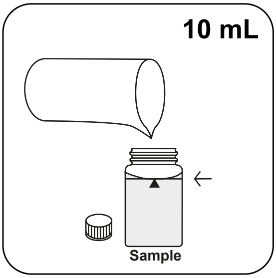
Für die Bestimmung von **Gesamteisen** den beschriebenen **Aufschluss** durchführen.



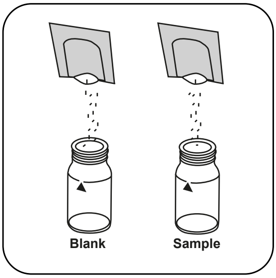
Zwei saubere 24-mm-Küvetten bereitstellen. Eine als Nullküvette kennzeichnen.



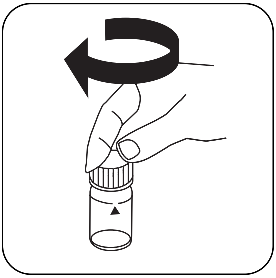
10 mL VE-Wasser in die Nullküvette geben.



10 mL Probe in die Probenküvette geben.

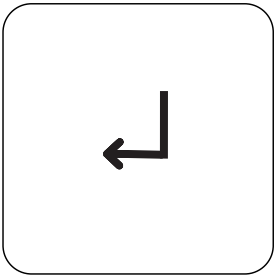


In jede Küvette **ein Vario IRON TPTZ F10 Pulverpäckchen** geben.

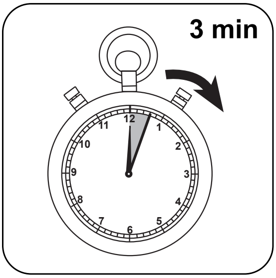


Küvette(n) verschließen.

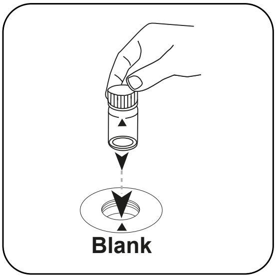
Inhalt durch Schütteln mischen (30 Sek.).



Taste **ENTER** drücken.



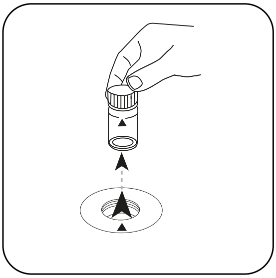
3 Minute(n) Reaktionszeit abwarten.



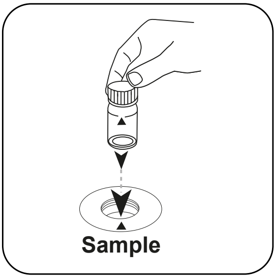
Die **Nullküvette** in den Messschacht stellen. Positionierung beachten.

Zero

Taste **ZERO** drücken.



Küvette aus dem Messschacht nehmen.



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

Test

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

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

Chemische Methode

TPTZ

Appendix

Störungen

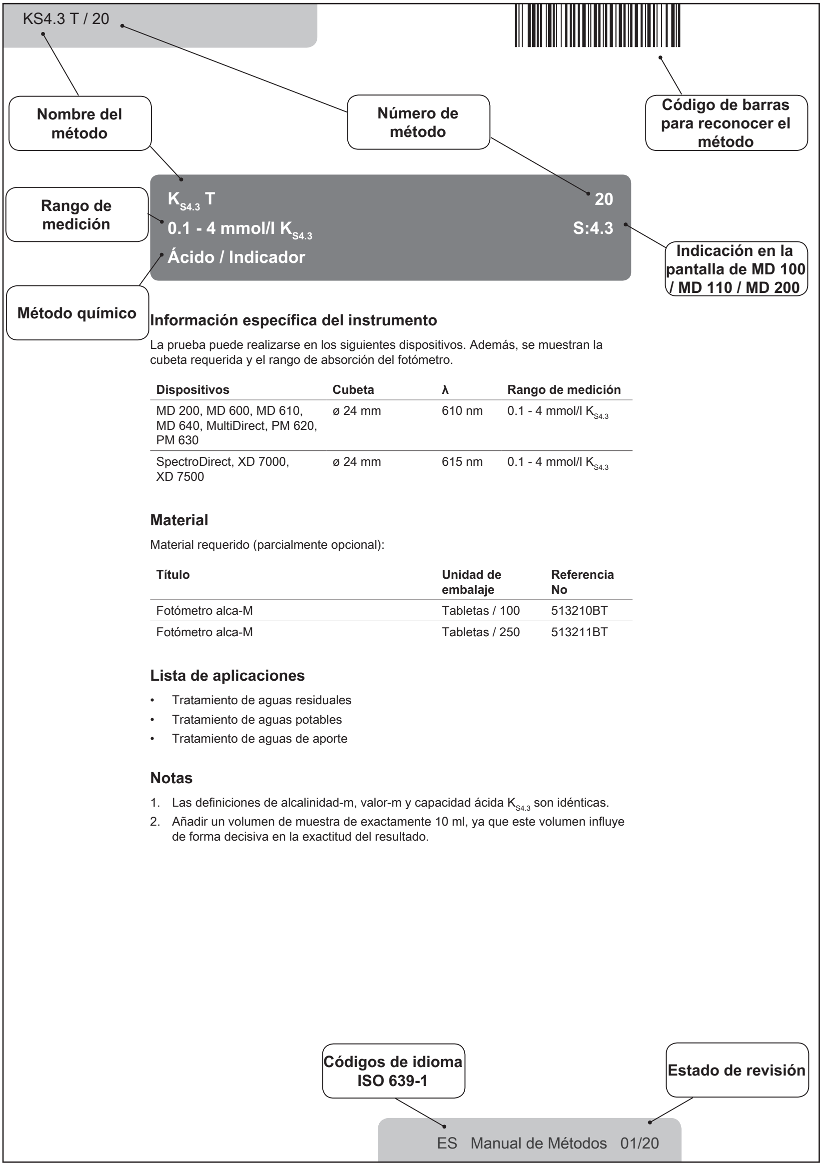
Permanente Störungen

Bei Auftretenden Störungen ist die Farbbildung gehemmt oder es bildet sich ein Niederschlag. Die Angaben beziehen sich auf einen Standard mit einer Eisenkonzentration von 0,5 mg/L.

Störung	Stört ab / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Literaturverweise

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ T **20**

0.1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

Ácido / Indicador

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

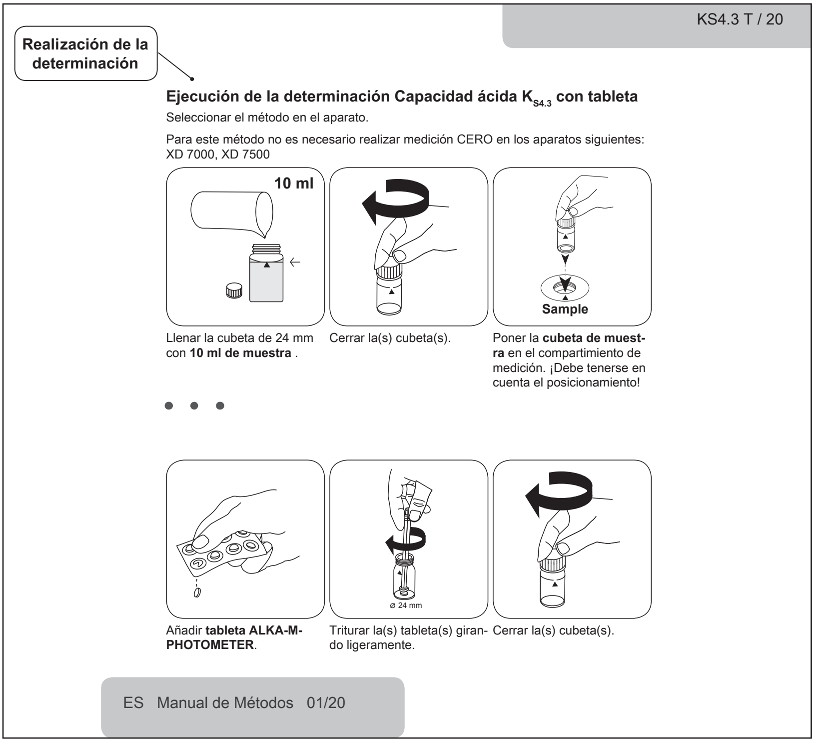
Lista de aplicaciones

- 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.

ES Manual de Métodos 01/20



KS4.3 T / 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).

ES Manual de Métodos 01/20

Hierro T M220

0.02 - 1 mg/L Fe FE

Ferrocina / Tioglicolato

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
Hierro II LR (Fe^{2+})	Tabletas / 100	515420BT
Hierro II LR (Fe^{2+})	Tabletas / 250	515421BT
Hierro LR (Fe^{2+} und Fe^{3+})	Tabletas / 100	515370BT
Hierro LR (Fe^{2+} und Fe^{3+})	Tabletas / 250	515371BT

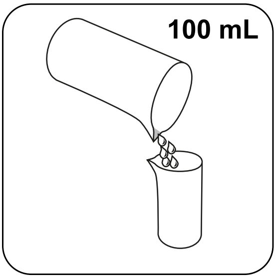
Preparación

1. Las aguas que han sido tratadas con compuestos orgánicos como protección contra la corrosión, etc., pueden oxidarse para destruir los complejos de hierro. Para ello se disuelve una muestra de 100 ml con 1 ml de ácido sulfúrico concentrado y 1 ml de ácido nítrico concentrado y se evapora a la mitad. Después de enfriarse se realiza la disgregación.

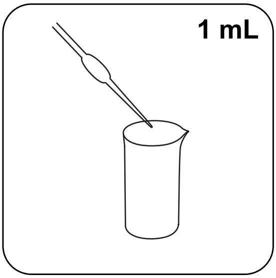
Notas

1. Con este método se realiza la determinación del Fe^{2+} y Fe^{3+} total disuelto.
2. Para determinar Fe^{2+} se utiliza la tableta IRON (II) LR, en lugar de la tableta IRON LR.

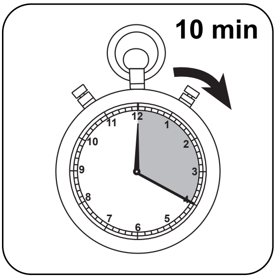
Disgregación



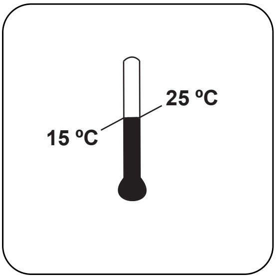
Llenar un recipiente de muestra apropiado con **100 mL de muestra**.



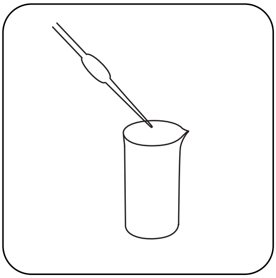
Añadir **1 mL de ácido sulfúrico concentrado**.



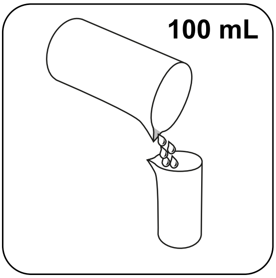
Calentar la muestra durante 10 minutos, o hasta que se haya disuelto totalmente.



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



Ajustar el **valor de pH** de la muestra con **solución amoniacal a 3-5**.



Rellenar la muestra con **agua desionizada hasta 100 mL** .

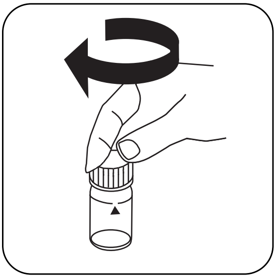
Utilizar esta muestra para el análisis de total de hierro disuelto y no disuelto.

Ejecución de la determinación Hierro (II,III), disuelto con tableta

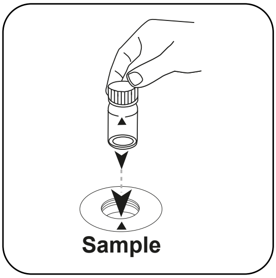
Seleccionar el método en el aparato.

Para la determinación de **Hierro disuelto y sin disolver realizar la disgregación** descrita.

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



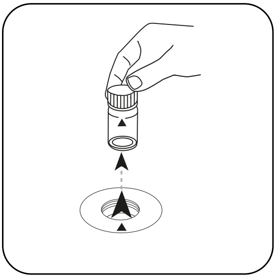
Cerrar la(s) cubeta(s).



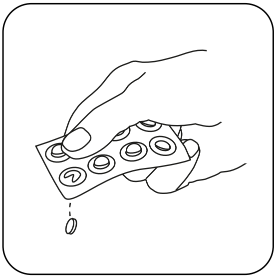
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

Zero

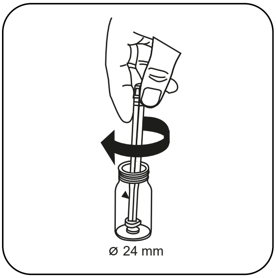
Pulsar la tecla **ZERO**.



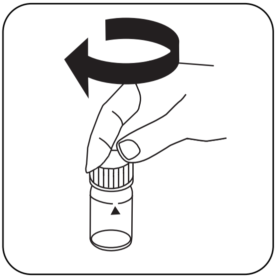
Extraer la cubeta del compartimiento de medición.



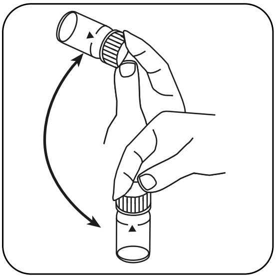
Añadir **tableta IRON LR**.



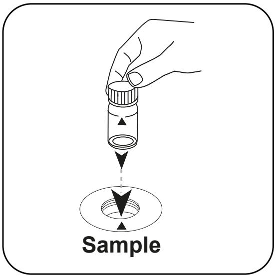
Triturar la(s) tableta(s) girando ligeramente.



Cerrar la(s) cubeta(s).



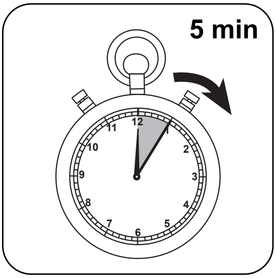
Disolver la(s) tableta(s) girando.



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

Test

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



Esperar **5 minutos como periodo de reacción**.

Finalizado el periodo de reacción se realizará la determinación automáticamente.

A continuación se visualizará el resultado en mg/L Hierro.

Método químico

Ferrocina / Tioglicolato

Apéndice

Interferencia

Interferencias extraibles

1. La presencia de cobre aumenta el resultado de medición un 10 %. Con una concentración de 10 mg/L de cobre en la muestra, el resultado de la medición se aumenta en 1 mg/L de hierro.
   La perturbación puede eliminarse añadiendo tiourea.

Validación del método

Límite de detección	0.01 mg/L
Límite de determinación	0.016 mg/L
Límite del rango de medición	1 mg/L
Sensibilidad	0.92 mg/L / Abs
Intervalo de confianza	0.013 mg/L
Desviación estándar	0.005 mg/L
Coeficiente de variación	1.23 %

Bibliografía

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

Hierro PP M222

0.02 - 3 mg/L Fe[g)] FE1

1,10-Fenantrolina

Material

Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
Hierro F10 VARIO	Polvos / 100 Cantidad	530560
Hierro F10 VARIO	Polvos / 1000 Cantidad	530563

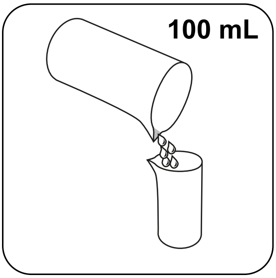
Preparación

1. El óxido de hierro necesita antes de la determinación una disgregación leve, fuerte o según Digesdahl (véase disgregación ácida).
2. Las muestras acuosas muy ácidas o muy básicas se han de diluir a un pH entre 3 y 5.
3. Las muestras que contengan óxidos visibles deberán mantener un periodo de reacción mínimo de 5 minutos.
4. Las aguas que han sido tratadas con compuestos orgánicos como protección contra la corrosión, etc., pueden oxidarse para destruir los complejos de hierro. Para ello se disuelve una muestra de 100 ml con 1 ml de ácido sulfúrico concentrado y 1 ml de ácido nítrico concentrado y se evapora a la mitad. Después de enfriarse se realiza la disgregación.

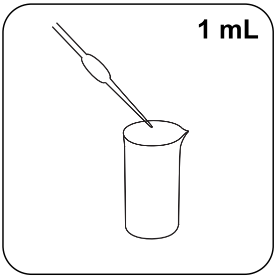
Notas

1. Con este método se realiza la determinación de todas las formas de hierro disuelto y la mayoría de hierro no disuelto.
2. Los polvos no disueltos no influyen en la exactitud del método.

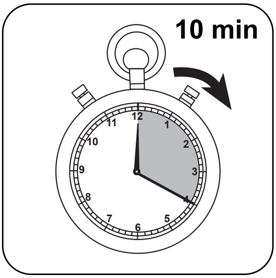
Disgregación



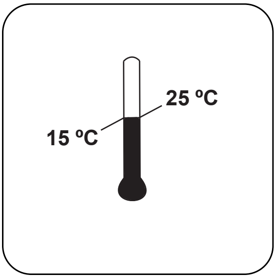
Llenar un recipiente de muestra apropiado con **100 mL de muestra**.



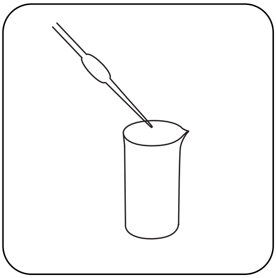
Añadir **1 mL de ácido sulfúrico concentrado**.



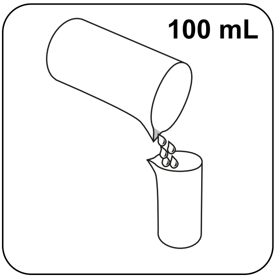
Calentar la muestra durante 10 minutos, o hasta que se haya disuelto totalmente.



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



Ajustar el **valor de pH** de la muestra con **solución amoniacal a 3-5**.



Rellenar la muestra con **agua desionizada hasta 100 mL** .

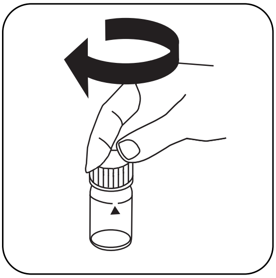
Utilizar esta muestra para el análisis de total de hierro disuelto y no disuelto.

Ejecución de la determinación Hierro (II,III), disuelto con sobres de polvos Vario

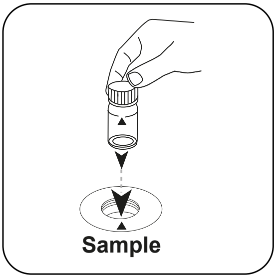
Seleccionar el método en el aparato.

Para la determinación de **Hierro con tableta realizar la disgregación** descrita.

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



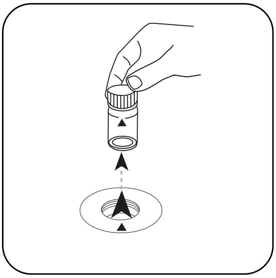
Cerrar la(s) cubeta(s).



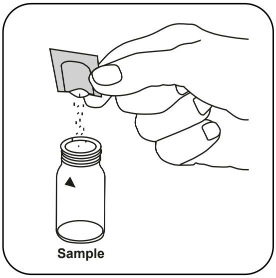
Poner la **cubeta de muestra** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

Zero

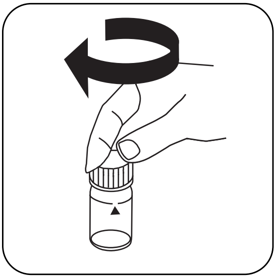
Pulsar la tecla **ZERO**.



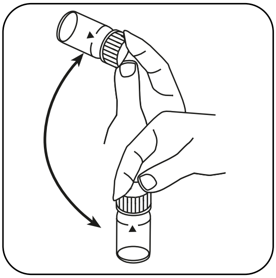
Extraer la cubeta del compartimiento de medición.



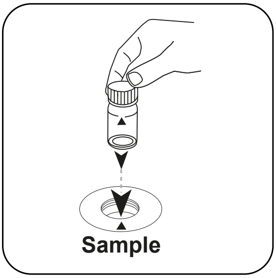
Añadir un **sobre de polvos Vario FERRO F10** .



Cerrar la(s) cubeta(s).



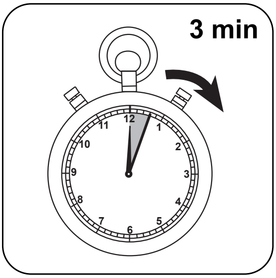
Mezclar el contenido girando.



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

Test

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



Esperar **3 minutos como periodo de reacción**.

Finalizado el periodo de reacción se realizará la determinación automáticamente.

A continuación se visualizará el resultado en mg/L Hierro.

Método químico

1,10-Fenantrolina

Apéndice

Interferencia

Interferencias persistentes

1. El iridio perturba la determinación.

De acuerdo a

DIN 38406-E1
Método estándar 3500-Fe-1997
US EPA 40 CFR 136

[9] Reagente prende la mayor parte de los óxidos de hiero

Hierro (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Material

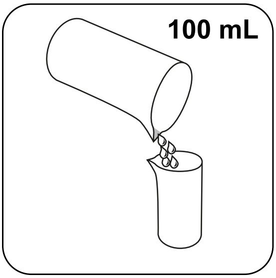
Material requerido (parcialmente opcional):

Reactivos	Unidad de embalaje	No. de referencia
Hierro TPTZ F10 VARIO	Polvos / 100 Cantidad	530550

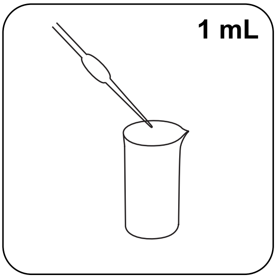
Preparación

1. Para la determinación del hierro total es necesaria una disgregación. El reactivo TPTZ registra la mayoría de los óxidos de hierro sin disgregación.
2. Para eliminar residuos férricos que pueden producir resultados más elevados, lavar todos los aparatos antes de su uso con una solución de ácido clorhídrico (1:1) enjuagándolos a continuación con agua desionizada.
3. Las muestras acuosas muy ácidas o muy básicas se deberán neutralizar a un valor de pH entre 3 y 8 antes de realizar el análisis (con 0,5 mol/l de ácido sulfúrico o 1 mol/l de hidróxido sódico).
4. Las aguas que han sido tratadas con compuestos orgánicos como protección contra la corrosión, etc., pueden oxidarse para destruir los complejos de hierro. Para ello se disuelve una muestra de 100 ml con 1 ml de ácido sulfúrico concentrado y 1 ml de ácido nítrico concentrado y se evapora a la mitad. Después de enfriarse se realiza la disgregación.

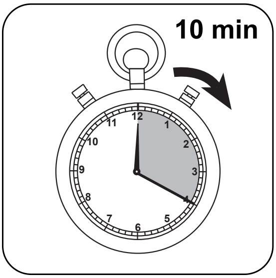
Disgregación



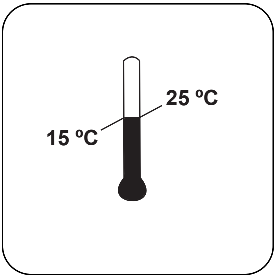
Llenar un recipiente de muestra apropiado con **100 mL de muestra**.



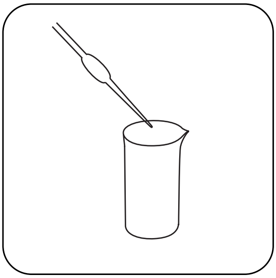
Añadir **1 mL de ácido sulfúrico concentrado**.



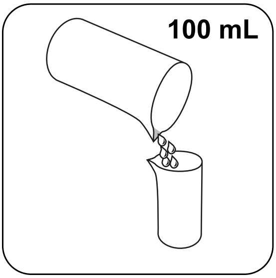
Calentar la muestra durante 10 minutos, o hasta que se haya disuelto totalmente.



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



Ajustar el **valor de pH** de la muestra con **solución amoniacal a 3-5**.



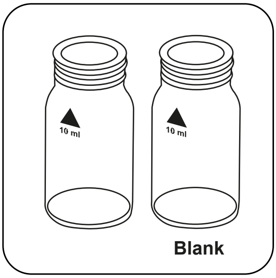
Rellenar la muestra con **agua desionizada hasta 100 mL** .

Utilizar esta muestra para el análisis de total de hierro disuelto y no disuelto.

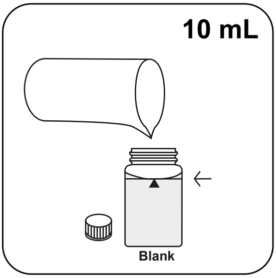
Ejecución de la determinación Hierro, total con sobres de polvos Vario

Seleccionar el método en el aparato.

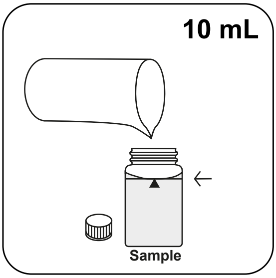
Para la determinación de **Hierro total realizar la disgregación** descrita.



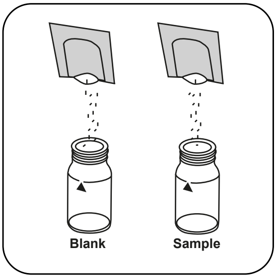
Preparar dos cubetas limpias de 24 mm. Identificar una como cubeta en blanco.



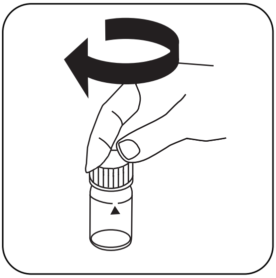
Añadir **10 mL de agua desionizada** en la cubeta en blanco.



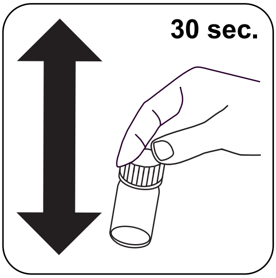
Añadir **10 mL de muestra** en la cubeta con la muestra.



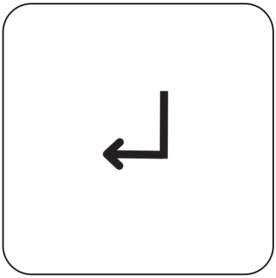
Añadir **un sobre de polvos de Vario IRON TPTZ F10** en cada cubeta.



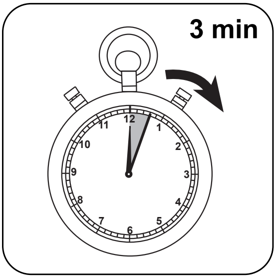
Cerrar la(s) cubeta(s).



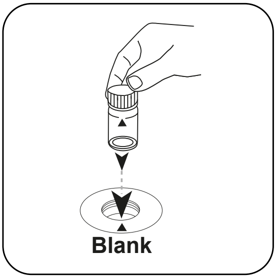
Mezclar el contenido agitando (30 sec.).



Pulsar la tecla **ENTER**.



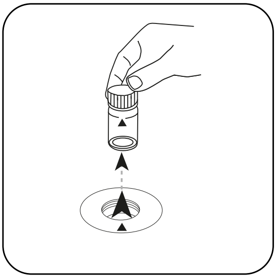
Esperar **3 minutos como periodo de reacción**.



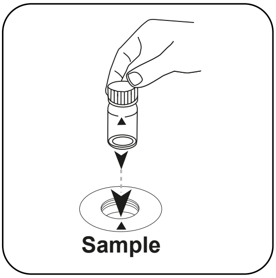
Poner la **cubeta en blanco** en el compartimiento de medición. ¡Debe tenerse en cuenta el posicionamiento!

Zero

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!

Test

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

A continuación se visualizará el resultado en mg/L Hierro.

Método químico

TPTZ

Apéndice

Interferencia

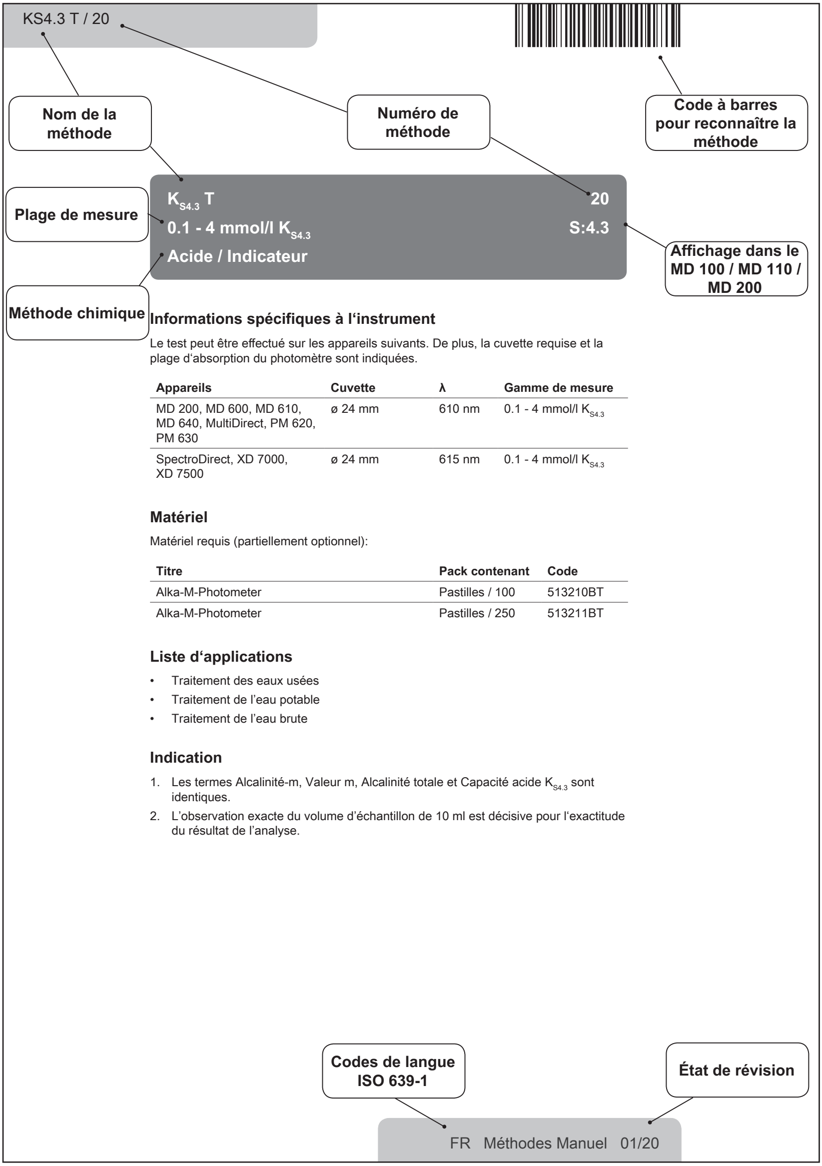
Interferencias persistentes

Si se producen perturbaciones se inhibe la coloración o se forma precipitación. Los datos se refieren a un estándar con una concentración de hierro de 0,5 mg/L.

Interferencia	de / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Bibliografía

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ T **20**

0.1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

Acide / Indicateur

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

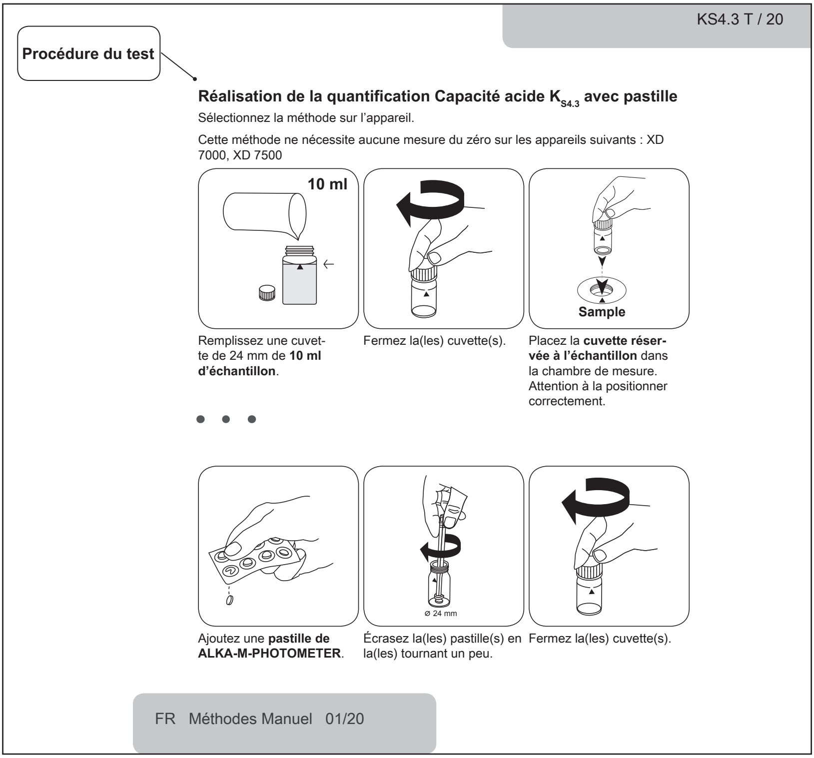
Liste d‘applications

- 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.

FR Méthodes Manuel 01/20



Procédure du test

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

Sélectionnez la méthode sur l'appareil.

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

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

Fermez la(les) cuvette(s).

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

● ● ●

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

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

Fermez la(les) cuvette(s).

Fer T M220

0.02 - 1 mg/L Fe FE

Ferrozine / Thioglycolate

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
Fer II LR (Fe^{2+})	Pastilles / 100	515420BT
Fer II LR (Fe^{2+})	Pastilles / 250	515421BT
Fer LR (Fe^{2+} und Fe^{3+})	Pastilles / 100	515370BT
Fer LR (Fe^{2+} und Fe^{3+})	Pastilles / 250	515371BT

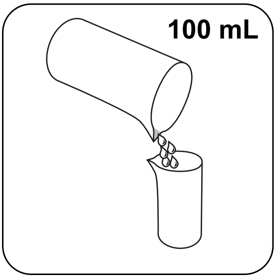
Préparation

1. Il faudra éventuellement oxyder les eaux auparavant traitées avec des composés organiques pour les protéger de la corrosion etc. afin de détruire les complexes du fer. À un échantillon de 100 ml, on ajoutera 1 ml d’acide sulfurique concentré et 1 ml d'acide nitrique concentré pour réduire le tout de moitié par évaporation. Le fractionnement est effectué après le refroidissement.

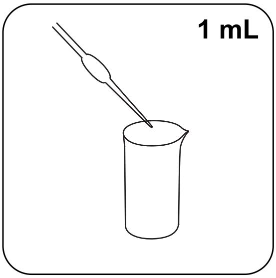
Indication

1. Cette méthode permet de quantifier le Fe^{2+} total dissous et Fe^{3+}.
2. Pour la quantification du Fe^{2+}, la pastille IRON LR est remplacée par la pastille IRON (II) LR.

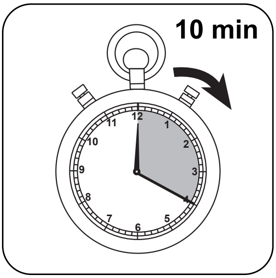
Fractionnement



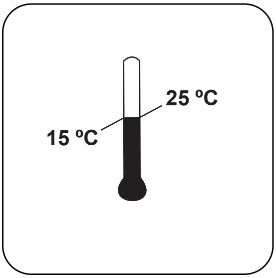
Versez **100 mL d’échantillon** dans un tube pour échantillon adéquat.



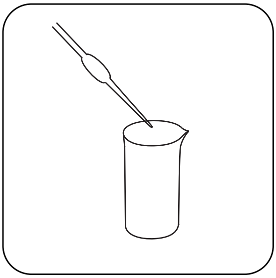
Ajoutez **1 mL de d’acide sulfurique concentré** .



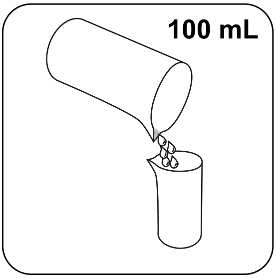
Réchauffez l’échantillon pendant **10 minutes,** ou jusqu’à ce que tout soit entièrement dissous.



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



Réglez le **pH** de l’échantillon avec **solution ammoniaquée pour obtenir 3-5**.



Complétez l’échantillon en ajoutant **d’eau déminéralisée pour obtenir 100 mL** .

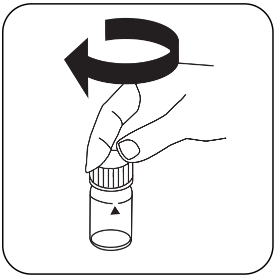
Utilisez cet échantillon pour analyser Fer total résolu et dissous.

Réalisation de la quantification Fer (II,III), dissous avec pastille

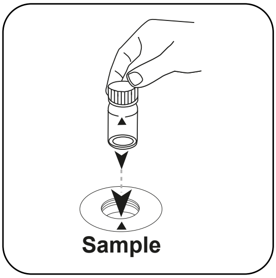
Sélectionnez la méthode sur l’appareil.

Pour la quantification de **Fer dissous et non dissous, procédez au fractionnement** décrit .

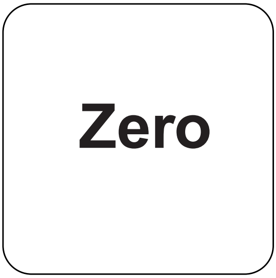
Remplissez une cuvette de 24 mm de **10 mL d'échantillon**.



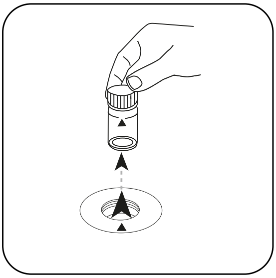
Fermez la(les) cuvette(s).



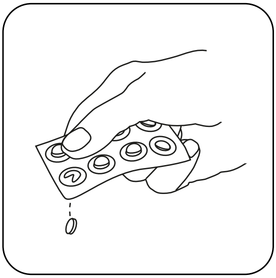
Placez la **cuvette réservée à l'échantillon** dans la chambre de mesure. Attention à la positionner correctement.



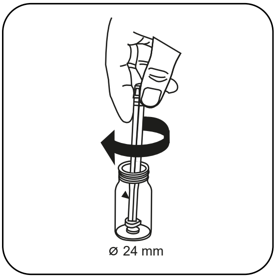
Appuyez sur la touche **ZERO**.



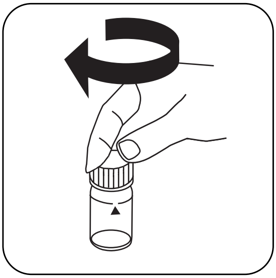
Retirez la cuvette de la chambre de mesure.



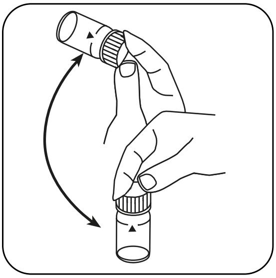
Ajoutez une **pastille de IRON LR**.



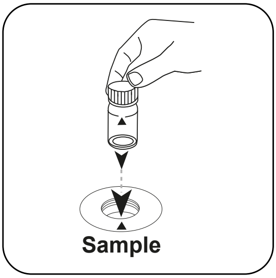
Écrasez la(les) pastille(s) en la(les) tournant un peu.



Fermez la(les) cuvette(s).



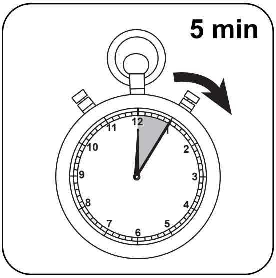
Dissolvez la(les) pastille(s) en mettant le tube plusieurs fois à l'envers.



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

Test

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



Attendez la fin du **temps de réaction de 5 minute(s)** .

À l’issue du temps de réaction, la mesure est effectuée automatiquement.

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

Méthode chimique

Ferrozine / Thioglycolate

Appendice

Interférences

Interférences exclues

1. La présence de cuivre augmente le résultat de 10 %. À une concentration de cuivre égale à 10 mg/L dans l'échantillon, le résultat augmente de 1 mg/L de fer.
   La perturbation peut être éliminée par un apport de thiocarbamide.

Méthode Validation

Limite de détection	0.01 mg/L
Limite de détermination	0.016 mg/L
Fin de la gamme de mesure	1 mg/L
Sensibilité	0.92 mg/L / Abs
Intervalle de confiance	0.013 mg/L
Déviation standard	0.005 mg/L
Coefficient de variation	1.23 %

Bibliographie

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

Fer PP M222

0.02 - 3 mg/L Fe[g)] FE1

1,10-Phénanthroline

Matériel

Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
VARIO Ferro F10	Poudre / 100 Pièces	530560
VARIO Ferro F10	Poudre / 1000 Pièces	530563

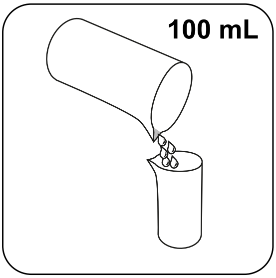
Préparation

1. Avant de pouvoir être analysé, l’oxyde de fer nécessite un fractionnement faible, fort ou Digesdahl (procédure de fractionnement acide).
2. Avant l’analyse, les eaux fortement alcalines ou acides devraient être ajustées sur un pH compris entre 3 et 5.
3. Pour les échantillons ayant des traces visibles de rouille, il est recommandé de respecter un temps de réaction d’au moins 5 minutes.
4. Il faudra éventuellement oxyder les eaux auparavant traitées avec des composés organiques pour les protéger de la corrosion etc. afin de détruire les complexes du fer. À un échantillon de 100 ml, on ajoutera 1 ml d’acide sulfurique concentré et 1 ml d'acide nitrique concentré pour réduire le tout de moitié par évaporation. Le fractionnement est effectué après le refroidissement.

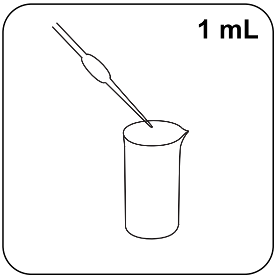
Indication

1. Cette méthode permet de quantifier toutes les formes de fer dissous et la plupart des formes de fer non dissous.
2. L'exactitude n'est pas diminuée par de la poudre non dissoute.

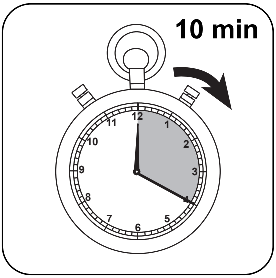
Fractionnement



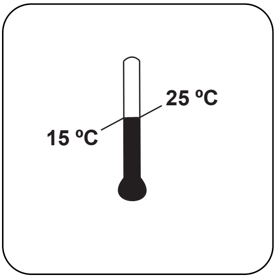
Versez **100 mL d’échantillon** dans un tube pour échantillon adéquat.



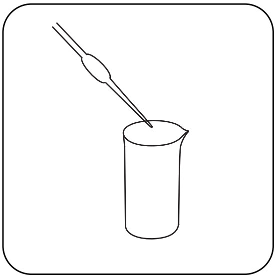
Ajoutez **1 mL de d’acide sulfurique concentré** .



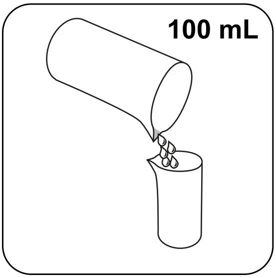
Réchauffez l’échantillon pendant **10 minutes,** ou jusqu’à ce que tout soit entièrement dissous.



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



Réglez le **pH** de l’échantillon avec **solution ammoniaquée pour obtenir 3-5**.



Complétez l’échantillon en ajoutant **d’eau déminéralisée pour obtenir 100 mL** .

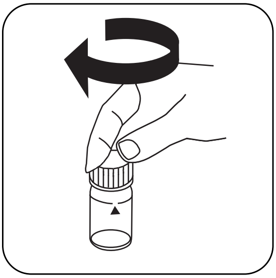
Utilisez cet échantillon pour analyser Fer total résolu et dissous.

Réalisation de la quantification Fer (II,III), dissous avec sachet de poudre Vario

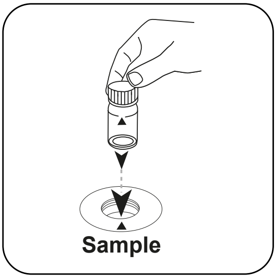
Sélectionnez la méthode sur l’appareil.

Pour la quantification de **Fer avec pastille, procédez au fractionnement** décrit .

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



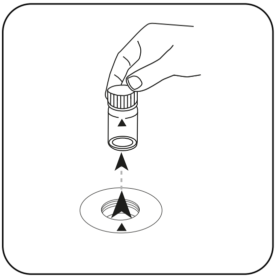
Fermez la(les) cuvette(s).



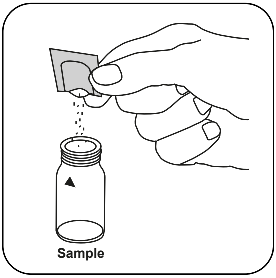
Placez la **cuvette réservée à l’échantillon** dans la chambre de mesure. Attention à la positionner correctement.

Zero

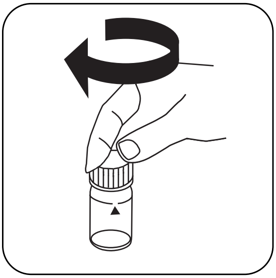
Appuyez sur la touche **ZERO**.



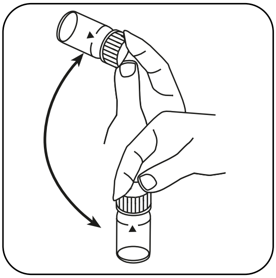
Retirez la cuvette de la chambre de mesure.



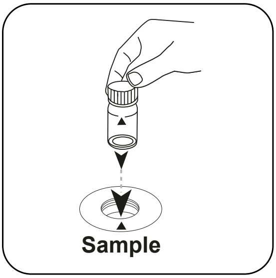
Ajoutez un **sachet de poudre Vario FERRO F10**.



Fermez la(les) cuvette(s).



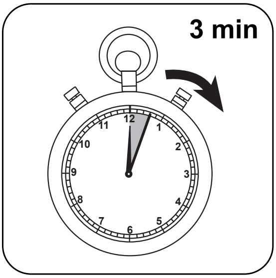
Mélangez le contenu en mettant le tube plusieurs fois à l’envers puis à l’endroit.



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

Test

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



Attendez la fin du **temps de réaction de 3 minute(s)** .

À l’issue du temps de réaction, la mesure est effectuée automatiquement.

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

Méthode chimique

1,10-Phénanthroline

Appendice

Interférences

Interférences persistantes

1. L’iridium perturbe la quantification.

Selon

DIN 38406-E1
Standard Method 3500-Fe-1997
US EPA 40 CFR 136

[9] Ce réactif réagit à la plupart des oxydes de fer

Fer (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Matériel

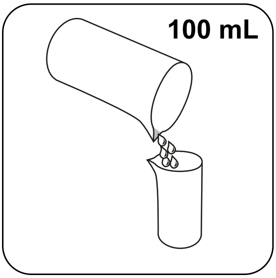
Matériel requis (partiellement optionnel):

Réactifs	Pack contenant	Code
VARIO Fer TPTZ F10	Poudre / 100 Pièces	530550

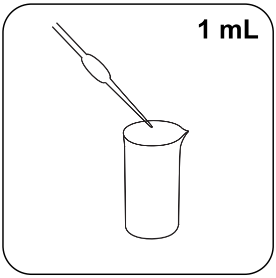
Préparation

1. La quantification du fer total nécessite un fractionnement. Le réactif TPTZ détecte la plupart des oxydes de fer sans fractionnement.
2. Avant l’analyse, lavez tous les instruments en verre en utilisant une solution d’acide chlorhydrique diluée (1:1) puis rincez-les à l'eau déminéralisée afin d’éliminer les dépôts de fer susceptibles d'augmenter légèrement les résultats.
3. Avant l’analyse, les eaux fortement alcalines ou acides devraient être ajustées sur un pH compris entre 3 et 8 (avec 0,5 mol/l d'acide sulfurique ou 1 mol/l de soude caustique).
4. Il faudra éventuellement oxyder les eaux auparavant traitées avec des composés organiques pour les protéger de la corrosion etc. afin de détruire les complexes du fer. À un échantillon de 100 ml, on ajoutera 1 ml d’acide sulfurique concentré et 1 ml d'acide nitrique concentré pour réduire le tout de moitié par évaporation. Le fractionnement est effectué après le refroidissement.

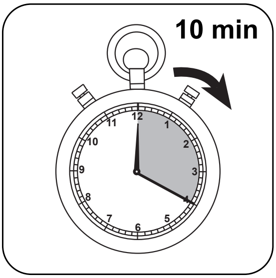
Fractionnement



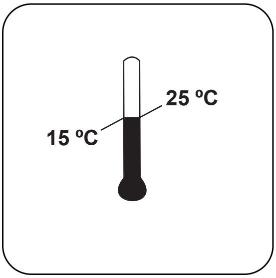
Versez **100 mL d’échantillon** dans un tube pour échantillon adéquat.



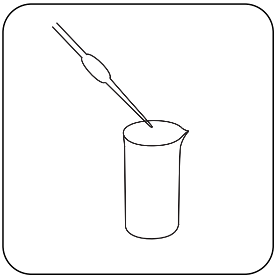
Ajoutez **1 mL de d’acide sulfurique concentré** .



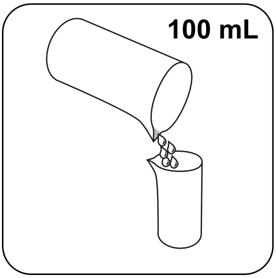
Réchauffez l’échantillon pendant **10 minutes,** ou jusqu’à ce que tout soit entièrement dissous.



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



Réglez le **pH** de l’échantillon avec **solution ammoniaquée pour obtenir 3-5**.



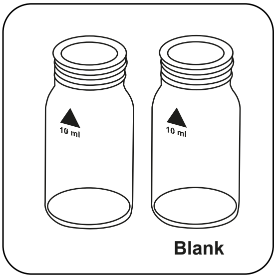
Complétez l’échantillon en ajoutant **d’eau déminéralisée pour obtenir 100 mL** .

Utilisez cet échantillon pour analyser Fer total résolu et dissous.

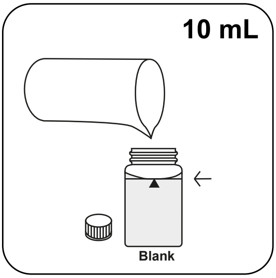
Réalisation de la quantification Fer, total avec sachet de poudre Vario

Sélectionnez la méthode sur l’appareil.

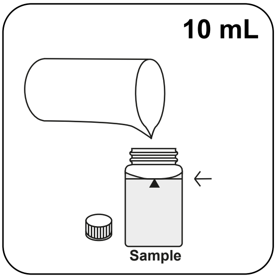
Pour la quantification de **Fer total, procédez au fractionnement** décrit .



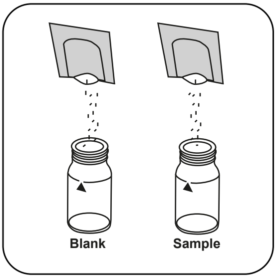
Préparez deux cuvettes propres de 24 mm. L’une des deux cuvettes sera la cuvette du blanc. Étiquetez-la.



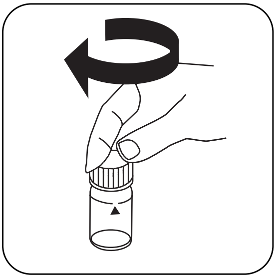
Versez **10 mL d'eau déminéralisée** dans la cuvette du blanc.



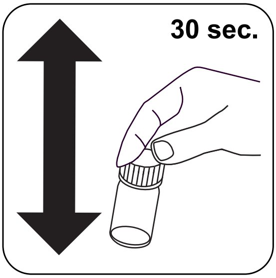
Versez **10 mL d’échantillon** dans la cuvette réservée à l’échantillon.



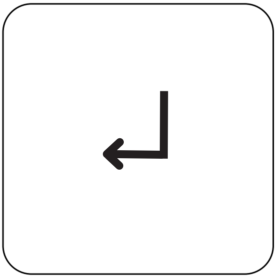
Dans chaque cuvette, versez **un sachet de poudre Vario IRON TPTZ F10**.



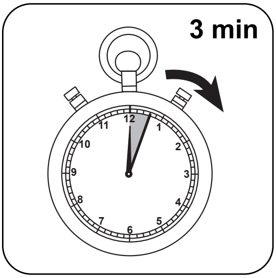
Fermez la(les) cuvette(s).



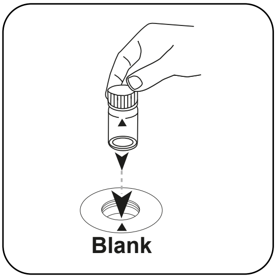
Mélangez le contenu en agitant (30 sec.).



Appuyez sur la touche **ENTER**.



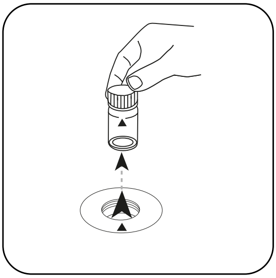
Attendez la fin du **temps de réaction de 3 minute(s)** .



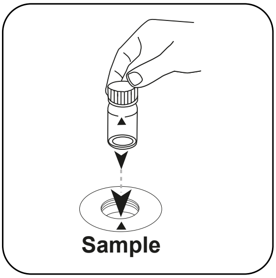
Placez la **cuvette du blanc** dans la chambre de mesure. Attention à la positionner correctement.

Zero

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.

Test

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

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

Méthode chimique

TPTZ

Appendice

Interférences

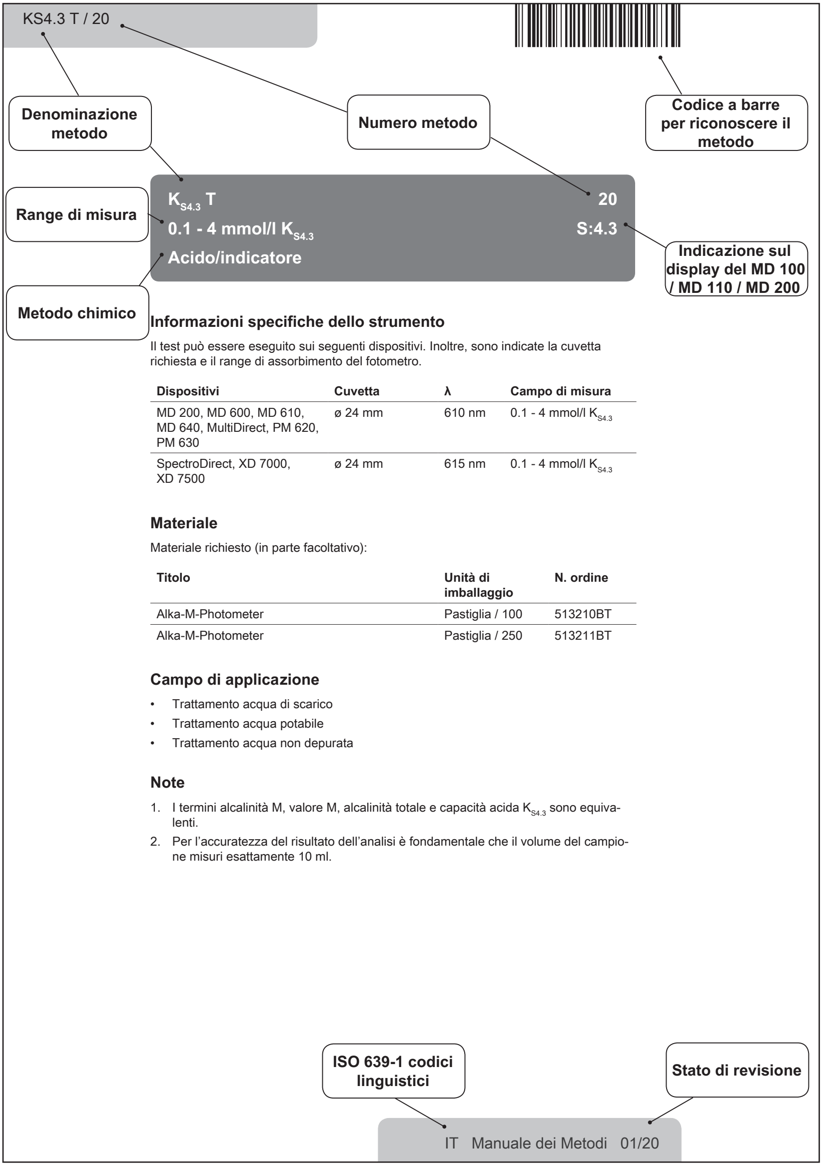
Interférences persistantes

En cas de perturbation, la coloration est bloquée ou il se forme un précipité. Les indications s'appuient sur un étalon caractérisé par une concentration de fer égale à 0,5 mg/L.

Interférences	de / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Bibliographie

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ T **20**

0.1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

Acido/indicatore

Informazioni specifiche dello strumento

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

Dispositivi	Cuvetta	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

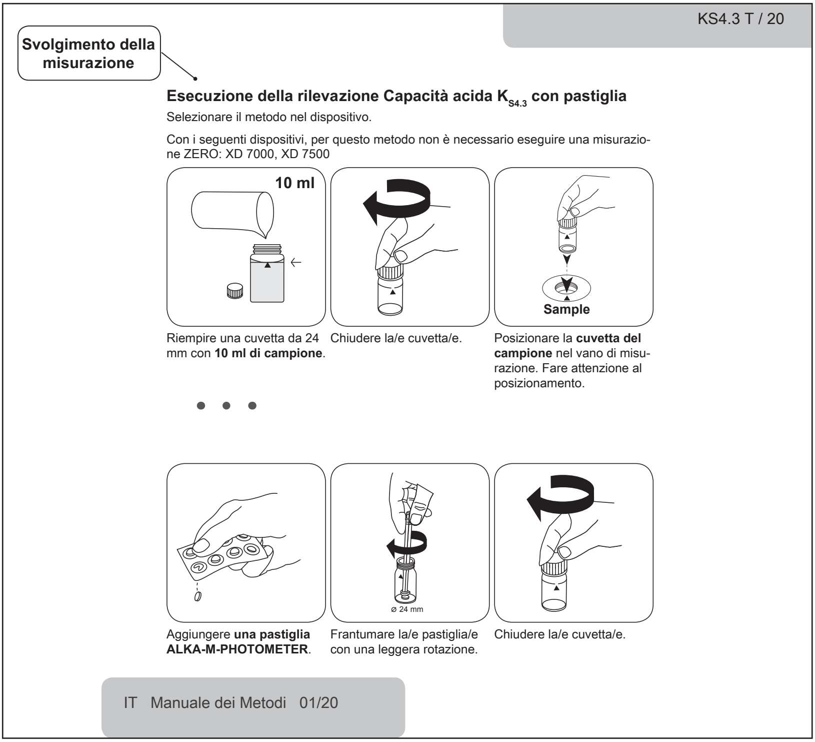
Campo di applicazione

- 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.

IT Manuale dei Metodi 01/20



KS4.3 T / 20

Svolgimento della misurazione

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

Selezionare il metodo nel dispositivo.

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

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

Chiudere la/e cuvetta/e.

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

● ● ●

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

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

Chiudere la/e cuvetta/e.

IT Manuale dei Metodi 01/20

Ferro T M220

0.02 - 1 mg/L Fe FE

Ferrozine / acido tioglicolico

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
Ferro II LR (Fe^{2+})	Pastiglia / 100	515420BT
Ferro II LR (Fe^{2+})	Pastiglia / 250	515421BT
Ferro LR (Fe^{2+} und Fe^{3+})	Pastiglia / 100	515370BT
Ferro LR (Fe^{2+} und Fe^{3+})	Pastiglia / 250	515371BT

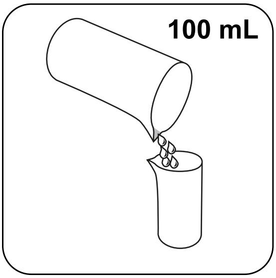
Preparazione

1. Le acque che sono state trattate con composti organici che proteggono dalla corrosione devono essere eventualmente ossidate per disgregare i complessi di ferro. A tale scopo si addiziona un campione da 100 ml con 1 ml di acido solforico concentrato e 1 ml di acido nitrico concentrato e lo si fa evaporare fino alla metà. Dopo il raffreddamento viene eseguita la digestione.

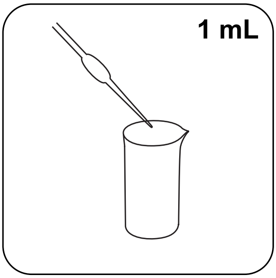
Note

1. Con questo metodo viene rilevato il totale del Fe^{2+} e del Fe^{3+} disciolti.
2. Per rilevare il Fe^{2+} si utilizza, invece della pastiglia IRON LR, la pastiglia IRON (II) LR.

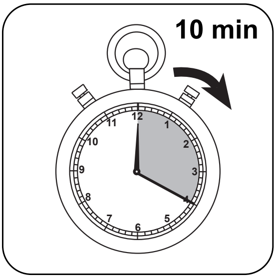
Digestione



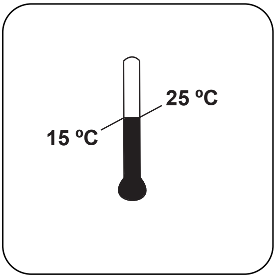
Riempire un recipiente per campioni adeguato con **100 mL di campione**.



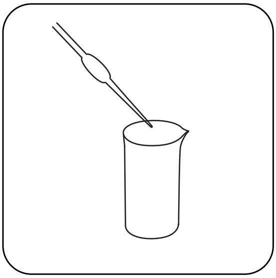
Aggiungere **1 mL di acido solforico concentrato**.



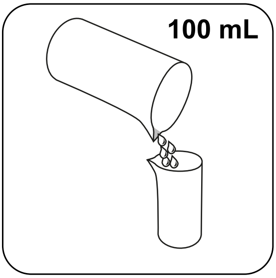
Riscaldare il campione per 10 minuti o finché non si sarà sciolto completamente.



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



Regolare il **valore di pH** del campione con **soluzione di ammoniaca su 3-5**.



Aggiungere al campione **acqua demineralizzata fino a raggiungere i 100 mL** .

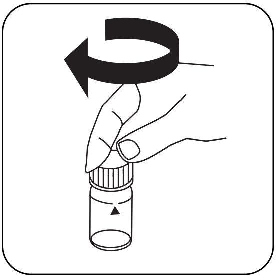
Utilizzare questo campione per l'analisi di Ferro soluto e disciolto totale.

Esecuzione della rilevazione Ferro(II,III), disciolto con pastiglia

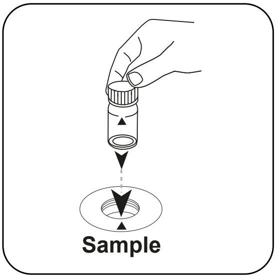
Selezionare il metodo nel dispositivo.

Per la determinazione di **Ferro disciolto e non disciolto** eseguire la **digestione** descritta.

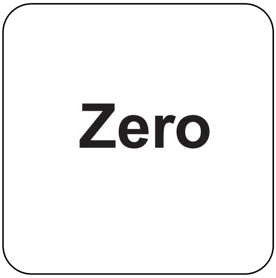
Riempire una cuvetta da 24 mm con **10 mL di campione**.



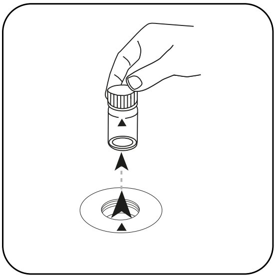
Chiudere la/e cuvetta/e.



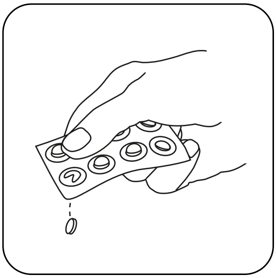
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.



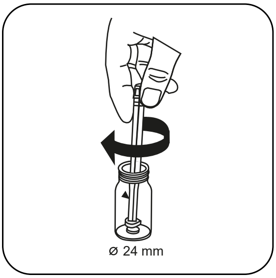
Premere il tasto **ZERO**.



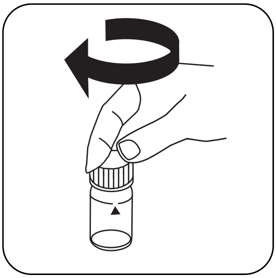
Prelevare la cuvetta dal vano di misurazione.



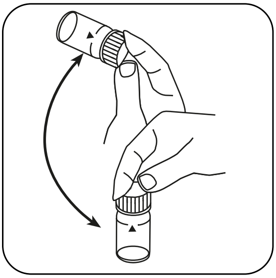
Aggiungere **una pastiglia IRON LR**.



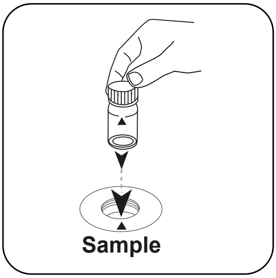
Frantumare la/e pastiglia/e con una leggera rotazione.



Chiudere la/e cuvetta/e.



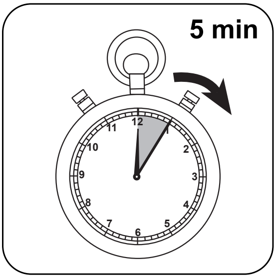
Far sciogliere la/e pastiglia/e agitando.



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

Test

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



Attendere un **tempo di reazione di 5 minuto/i** .

Allo scadere del tempo di reazione viene effettuata automaticamente la misurazione.

Sul display compare il risultato in mg/L di Ferro.

Metodo chimico

Ferrozine / acido tioglicolico

Appendice

Interferenze

Interferenze escludibili

1. La presenza di rame aumenta il risultato della misurazione del 10 %. Con una concentrazione di 10 mg/L di rame nel campione il risultato della misurazione viene aumentato di 1 mg/L di ferro.
   L'interferenza può essere eliminata con l'aggiunta di tiourea.

Validazione metodo

Limite di rilevabilità	0.01 mg/L
Limite di quantificazione	0.016 mg/L
Estremità campo di misura	1 mg/L
Sensibilità	0.92 mg/L / Abs
Intervallo di confidenza	0.013 mg/L
Deviazione standard della procedura	0.005 mg/L
Coefficiente di variazione della procedura	1.23 %

Riferimenti bibliografici

Photometrische Analyse, Lange/Vjedelek, Verlag Chemie 1980, pag. 102

Ferro PP M222

0.02 - 3 mg/L Fe[g) FE1

1,10-fenantrolina

Materiale

Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
VARIO Ferro F10	Polvere / 100 pz.	530560
VARIO Ferro F10	Polvere / 1000 pz.	530563

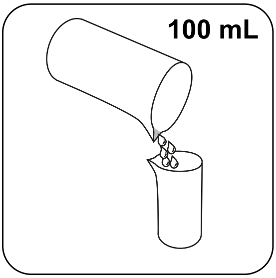
Preparazione

1. Prima dell'analisi, l'ossido di ferro richiede una digestione delicata, vigorosa o Digesdahl (processo di digestione acida).
2. Le acque fortemente alcaline o acide dovrebbero essere regolate prima dell'analisi su un valore di pH compreso tra 3 e 5.
3. Per i campioni con ruggine visibile è necessario osservare un tempo di reazione minimo di 5 minuti.
4. Le acque che sono state trattate con composti organici che proteggono dalla corrosione devono essere eventualmente ossidate per disgregare i complessi di ferro. A tale scopo si addiziona un campione da 100 ml con 1 ml di acido solforico concentrato e 1 ml di acido nitrico concentrato e lo si fa evaporare fino alla metà. Dopo il raffreddamento viene eseguita la digestione.

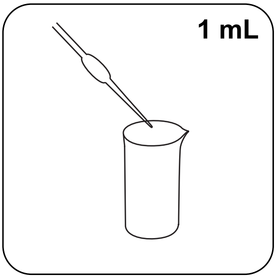
Note

1. Con questo metodo vengono misurate tutte le forme di ferro disciolto e la maggior parte delle forme di ferro non disciolto.
2. L'accuratezza non viene ridotta da eventuale polvere non disciolta.

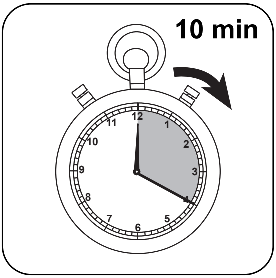
Digestione



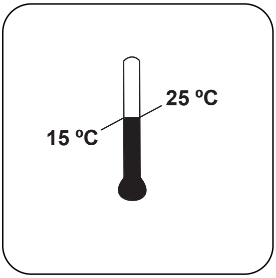
Riempire un recipiente per campioni adeguato con **100 mL di campione**.



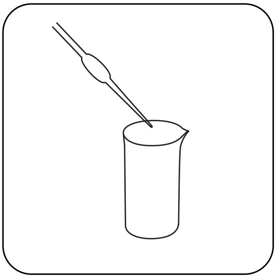
Aggiungere **1 mL di acido solforico concentrato**.



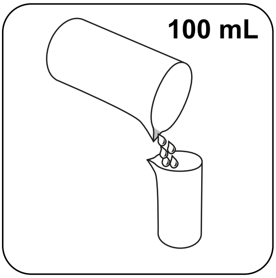
Riscaldare il campione per 10 minuti o finché non si sarà sciolto completamente.



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



Regolare il **valore di pH** del campione con **soluzione di ammoniaca su 3-5**.



Aggiungere al campione **acqua demineralizzata fino a raggiungere i 100 mL** .

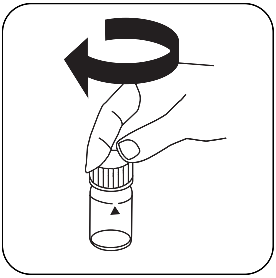
Utilizzare questo campione per l'analisi di Ferro soluto e disciolto totale.

Esecuzione della rilevazione Ferro(II,III), disciolto con polvere in bustine Vario

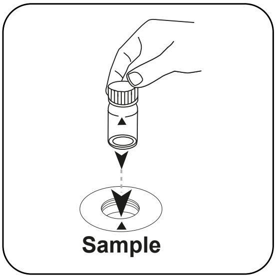
Selezionare il metodo nel dispositivo.

Per la determinazione di **Ferro con pastiglia** eseguire la **digestione** descritta.

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



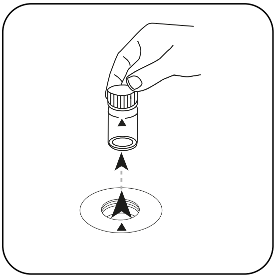
Chiudere la/e cuvetta/e.



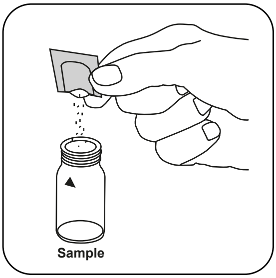
Posizionare la **cuvetta del campione** nel vano di misurazione. Fare attenzione al posizionamento.

Zero

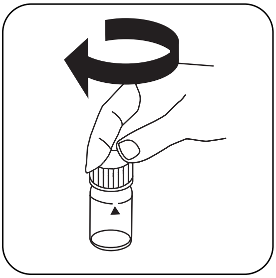
Premere il tasto **ZERO**.



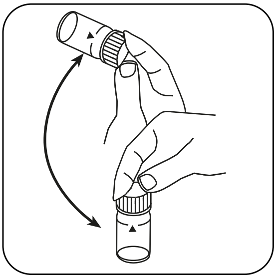
Prelevare la cuvetta dal vano di misurazione.



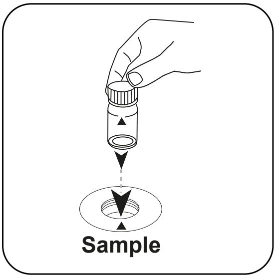
Aggiungere **una bustina di polvere Vario FERRO F10**.



Chiudere la/e cuvetta/e.



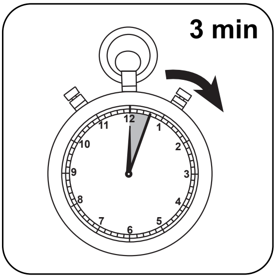
Miscelare il contenuto capovolgendo.



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

Test

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



Attendere un **tempo di reazione di 3 minuto/i** .

Allo scadere del tempo di reazione viene effettuata automaticamente la misurazione.

Sul display compare il risultato in mg/L di Ferro.

Metodo chimico

1,10-fenantrolina

Appendice

Interferenze

Interferenze permanenti

1. L'iridio interferisce con la rilevazione.

Secondo

DIN 38406-E1
Standard Method 3500-Fe-1997
US EPA 40 CFR 136

---

9) Il reagente cattura la maggior parte degli ossidi di ferro

Ferro (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Materiale

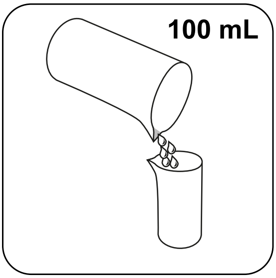
Materiale richiesto (in parte facoltativo):

Reagenti	Unità di imballaggio	N. ordine
VARIO Ferro TPTZ F10	Polvere / 100 pz.	530550

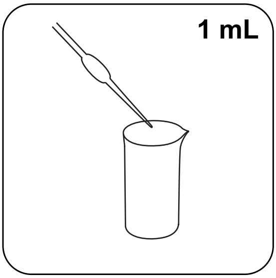
Preparazione

1. Per la rilevazione del ferro totale è necessaria una digestione. Il reagente TPTZ rileva la maggior parte degli ossidi di ferro senza digestione.
2. Prima dell’analisi sciacquare tutti i vetri di laboratorio con una soluzione di acido cloridrico diluita (1:1) e successivamente con acqua demineralizzata per eliminare i depositi di ferro, che potrebbero portare a risultati leggermente maggiorati.
3. Le acque fortemente alcaline o acide dovrebbero essere portate prima dell’analisi entro un range di pH compreso tra 3 e 8 (con 0,5 mol/l di acido solforico o 1 mol/l di liscivia).
4. Le acque che sono state trattate con composti organici che proteggono dalla corrosione devono essere eventualmente ossidate per disgregare i complessi di ferro. A tale scopo si addiziona un campione da 100 ml con 1 ml di acido solforico concentrato e 1 ml di acido nitrico concentrato e lo si fa evaporare fino alla metà. Dopo il raffreddamento viene eseguita la digestione.

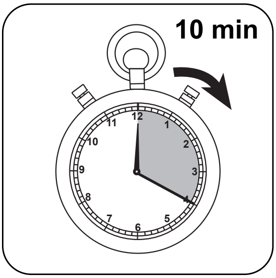
Digestione



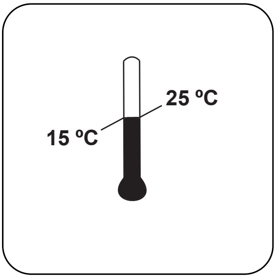
Riempire un recipiente per campioni adeguato con **100 mL di campione**.



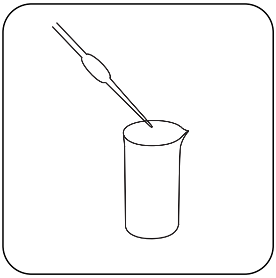
Aggiungere **1 mL di acido solforico concentrato**.



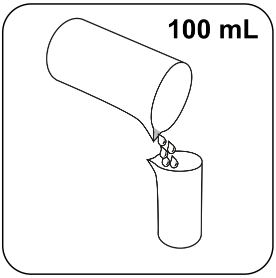
Riscaldare il campione per 10 minuti o finché non si sarà sciolto completamente.



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



Regolare il **valore di pH** del campione con **soluzione di ammoniaca su 3-5**.



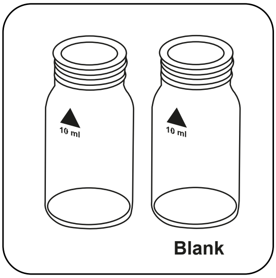
Aggiungere al campione **acqua demineralizzata fino a raggiungere i 100 mL** .

Utilizzare questo campione per l’analisi di Ferro soluto e disciolto totale.

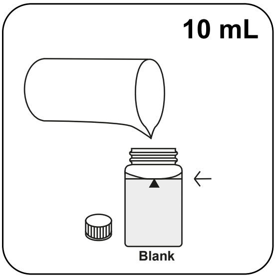
Esecuzione della rilevazione Ferro totale con polvere in bustine Vario

Selezionare il metodo nel dispositivo.

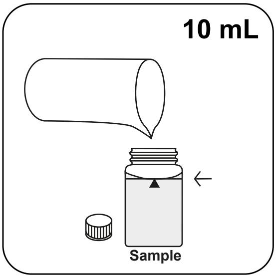
Per la determinazione di **Ferro totale** eseguire la **digestione** descritta.



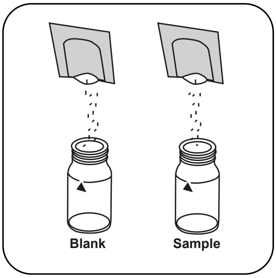
Preparare due cuvette pulite da 24 mm. Contrassegnare una cuvetta come cuvetta zero.



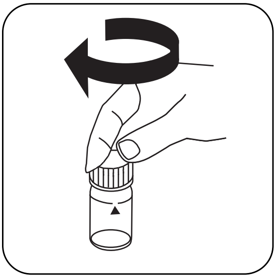
Immettere **10 mL di acqua demineralizzata** nella cuvetta zero.



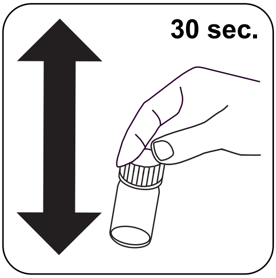
Immettere **10 mL di campione** nella cuvetta del campione.



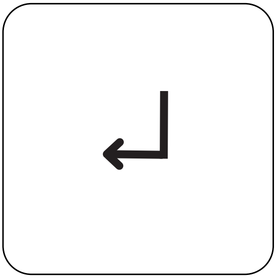
Immettere **una bustina di polvere Vario IRON TPTZ F10** in ogni cuvetta.



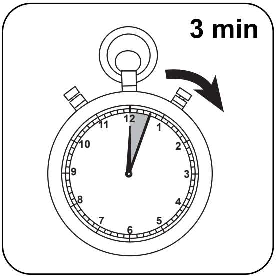
Chiudere la/e cuvetta/e.



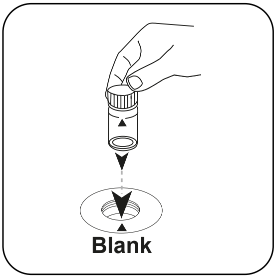
Miscelare il contenuto agitando (30 sec.).



Premere il tasto **ENTER**.



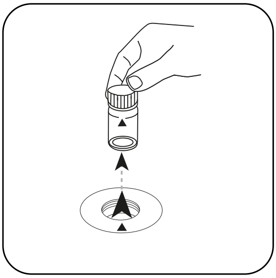
Attendere un **tempo di reazione di 3 minuto/i** .



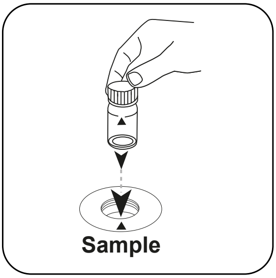
Posizionare la **cuvetta zero** nel vano di misurazione. Fare attenzione al posizionamento.

Zero

Premere il tasto **ZERO**.



Prelevare la cuvetta dal vano di misurazione.



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

Test

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

Sul display compare il risultato in mg/L di Ferro.

Metodo chimico

TPTZ

Appendice

Interferenze

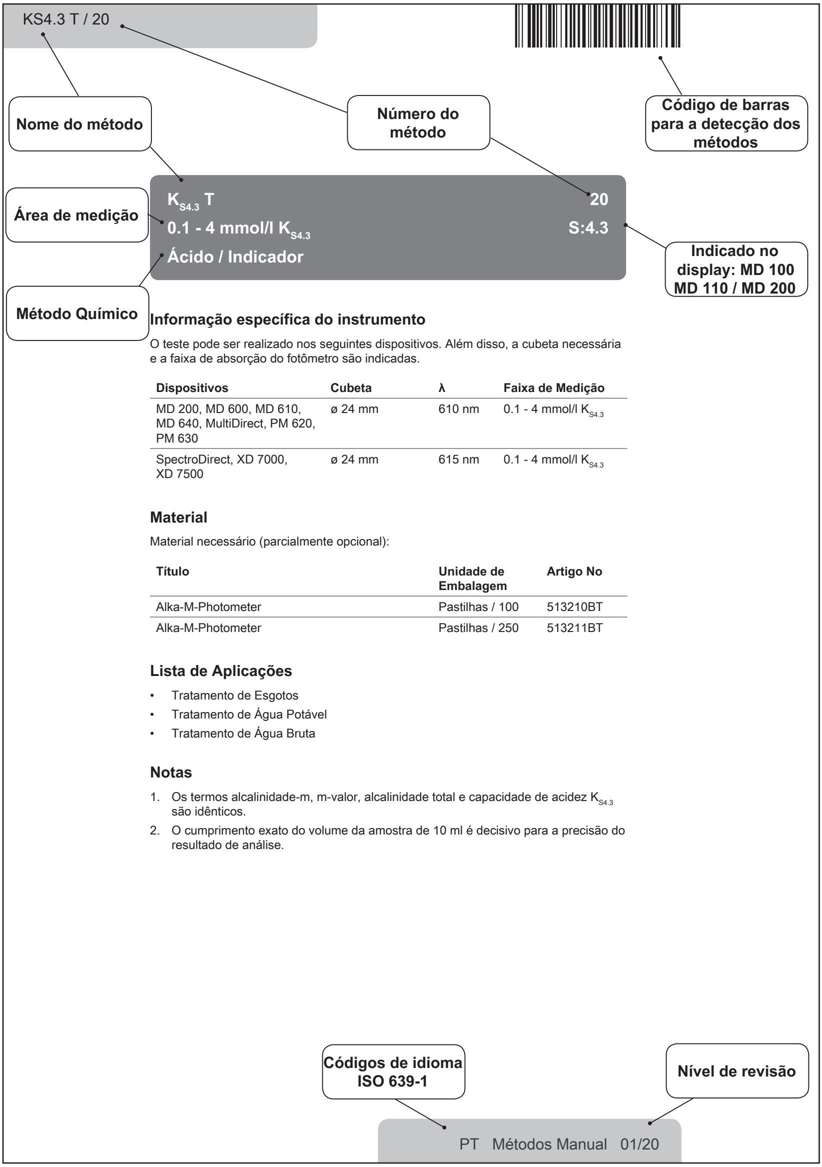
Interferenze permanenti

In caso di interferenze la formazione del colore viene ostacolata oppure si forma un precipitato. Le indicazioni si riferiscono a una soluzione standard con una concentrazione di ferro di 0,5 mg/L.

Interferenze	da / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^{-}	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^{-}	0.8

Riferimenti bibliografici

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ T 20

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

Ácido / Indicador

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.

PT Métodos Manual 01/20

Efetuar a medição

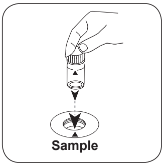
Realização da determinação Capacidade de acidez $K_{S4.3}$ com pastilha

Escolher o método no equipamento.

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

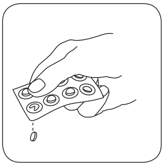
Encher a célula de 24 mm com **10 ml de amostra** .

Fechar a(s) célula(s).

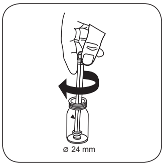


Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

• • •



Pastilha ALKA-M-PHOTOMETER.



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

Fechar a(s) célula(s).

Ferro T M220

0.02 - 1 mg/L Fe FE

Ferrozine / Thioglycolate

Material

Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
Iron II LR (Fe^{2+})	Pastilhas / 100	515420BT
Iron II LR (Fe^{2+})	Pastilhas / 250	515421BT
Iron LR (Fe^{2+} und Fe^{3+})	Pastilhas / 100	515370BT
Iron LR (Fe^{2+} und Fe^{3+})	Pastilhas / 250	515371BT

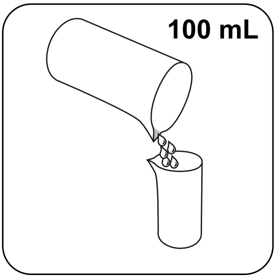
Preparação

1. As águas que foram tratadas com compostos orgânicos como proteção anticorrosiva, etc. têm de ser eventualmente oxidadas para destruir os complexos de ferro. Para isso, transfere-se uma amostra de 100 ml com 1 ml de ácido sulfúrico concentrado e 1 ml de ácido nítrico concentrado e evaporada para metade. Depois de arrefecer, passa-se à digestão.

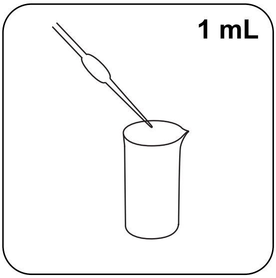
Notas

1. Neste método ocorre a determinação de Fe^{2+} e Fe^{3+} totalmente dissolvido.
2. Para determinar Fe^{2+} usa-se a pastilha IRON (II) LR, em vez da pastilha IRON LR.

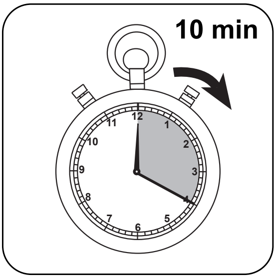
Digestão



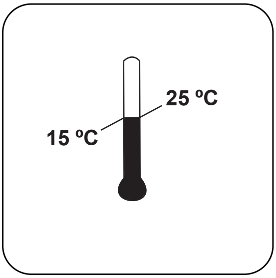
Encher um recipiente de amostra adequado com **100 mL de amostra** .



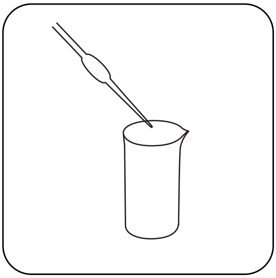
Adicionar **1 mL ácido sulfúrico concentrado** .



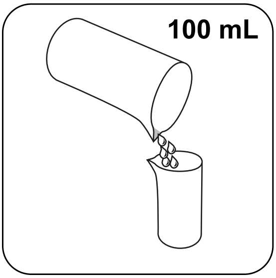
A amostra deve **aquecer durante 10 minutos,** ou até tudo se ter totalmente dissolvido.



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



Ajustar o **valor pH** da amostra com **solução amoniacal para 3-5**.



Encher a amostra com **água desmineralizada até 100 mL** .

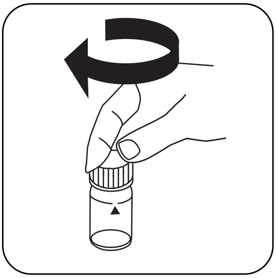
Usar esta amostra para a análise de total de ferro solvido e dissolvido.

Realização da determinação Ferro(II,III), dissolvido com pastilha

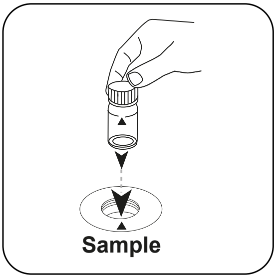
Escolher o método no equipamento.

Para a determinação de **Ferro dissolvido e não dissolvido** deve realizar a **digestão** descrita.

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



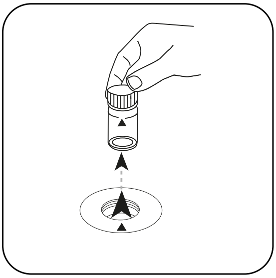
Fechar a(s) célula(s).



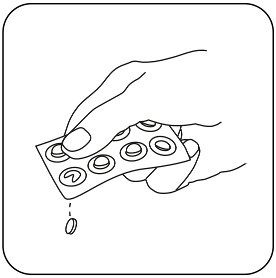
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.

Zero

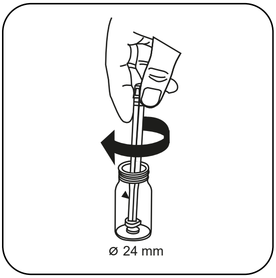
Premir a tecla **ZERO**.



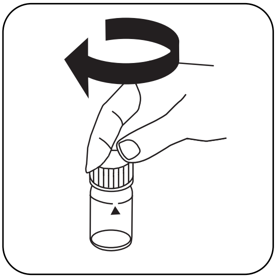
Retirar a célula do compartimento de medição.



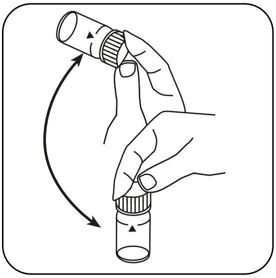
Pastilha IRON LR.



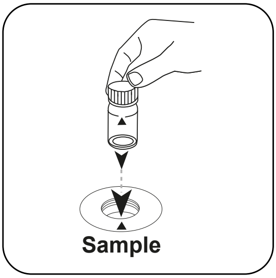
Esmagar a(s) pastilha(s) rodando ligeiramente.



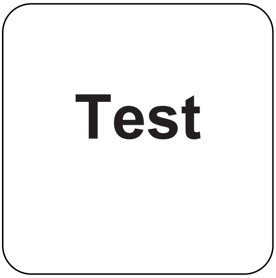
Fechar a(s) célula(s).



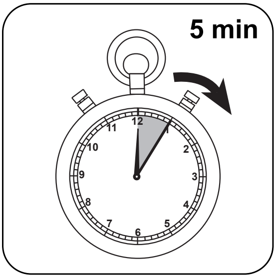
Dissolver a(s) pastilha(s) girando.



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



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



Aguardar **5 minuto(s) de tempo de reação**.

Decorrido o tempo de reação, a medição é efetuada automaticamente.

No visor aparece o resultado em mg/L Ferro.

Método Químico

Ferrozine / Thioglycolate

Apêndice

Texto de Interferências

Interferências Removíveis

1. A presença de cobre aumenta o resultado de medição em 10 %. Numa concentração de 10 mg/L de cobre na amostra, o resultado de medição aumenta em 1 mg/L de ferro.
   A interferência pode ser eliminada com a adição de tioureia

Validação de método

Limite de Detecção	0.01 mg/L
Limite de Determinação	0.016 mg/L
Fim da Faixa de Medição	1 mg/L
Sensibilidade	0.92 mg/L / Abs
Faixa de Confiança	0.013 mg/L
Desvio Padrão	0.005 mg/L
Coeficiente de Variação	1.23 %

Bibliografia

Análise fotométrica, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

Ferro PP M222

0.02 - 3 mg/L Fe[g)] FE1

1,10-Phenanthroline

Material

Material necessário (parcialmente opcional):

Reagentes	**Unidade de Embalagem**	**Código do Produto**
VARIO Iron F10	Pó / 100 pc.	530560
VARIO Iron F10	Pó / 1000 pc.	530563

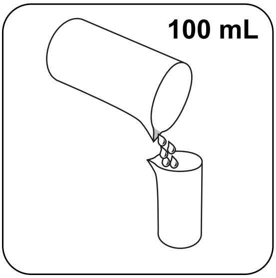
Preparação

1. Óxido de ferro requer, antes da análise, uma digestão fraca, forte ou Digesdahl (processo ácido de digestão).
2. As águas fortemente alcalinas ou ácidas deviam, antes da análise, ser ajustadas para um valor pH entre 3 e 5.
3. No caso de amostras que incluem ferrugem visível, devia manter um tempo de reação mínimo de 5 minutos.
4. As águas que foram tratadas com compostos orgânicos como proteção anticorrosiva, etc. têm de ser eventualmente oxidadas para destruir os complexos de ferro. Para isso, transfere-se uma amostra de 100 ml com 1 ml de ácido sulfúrico concentrado e 1 ml de ácido nítrico concentrado e evaporada para metade. Depois de arrefecer, passa-se à digestão.

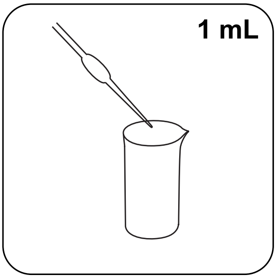
Notas

1. Neste método ocorre a determinação de todas as formas de ferro dissolvido e da maioria das formas de ferro não dissolvido.
2. A precisão não é reduzida pelo pó não dissolvido.

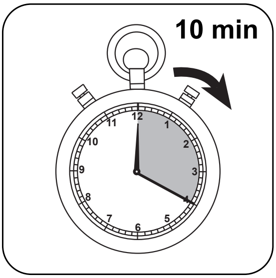
Digestão



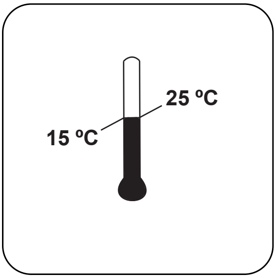
Encher um recipiente de amostra adequado com **100 mL de amostra** .



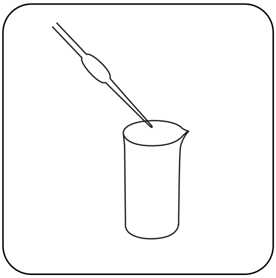
Adicionar **1 mL ácido sulfúrico concentrado** .



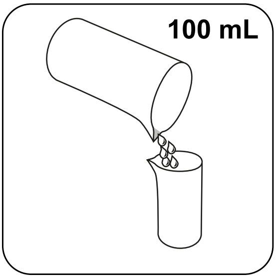
A amostra deve **aquecer durante 10 minutos,** ou até tudo se ter totalmente dissolvido.



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



Ajustar o **valor pH** da amostra com **solução amoniacal para 3-5**.



Encher a amostra com **água desmineralizada até 100 mL** .

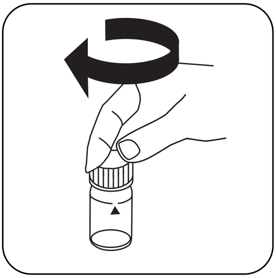
Usar esta amostra para a análise de total de ferro solvido e dissolvido.

Realização da determinação Ferro(II,III), dissolvido com pacote de pó Vario

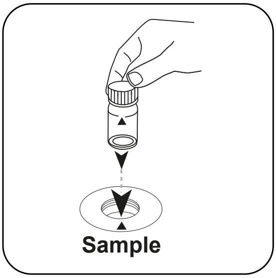
Escolher o método no equipamento.

Para a determinação de **Ferro com pastilha** deve realizar a **digestão** descrita.

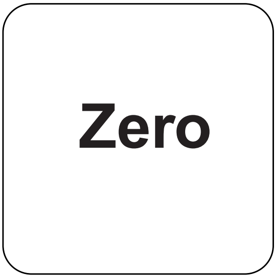
Encher a célula de 24 mm com **10 mL de amostra** .



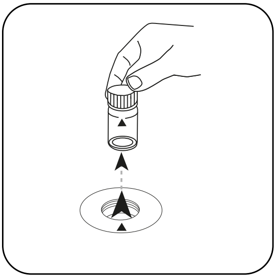
Fechar a(s) célula(s).



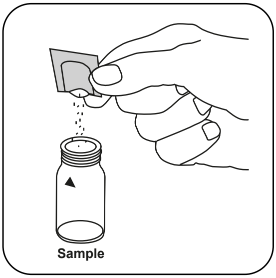
Colocar a **célula de amostra** no compartimento de medição. Observar o posicionamento.



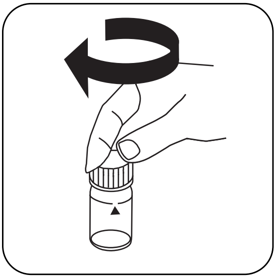
Premir a tecla **ZERO**.



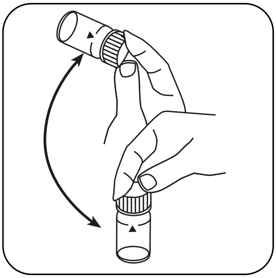
Retirar a célula do compartimento de medição.



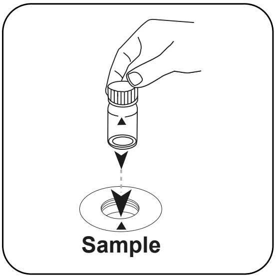
Adicionar um **pacote de pó Vario FERRO F10** .



Fechar a(s) célula(s).



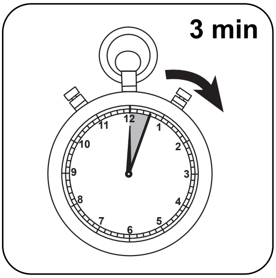
Misturar o conteúdo girando.



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

Test

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



Aguardar **3 minuto(s) de tempo de reação**.

Decorrido o tempo de reação, a medição é efetuada automaticamente.

No visor aparece o resultado em mg/L Ferro.

Método Químico

1,10-Phenanthroline

Apêndice

Texto de Interferências

Interferências Pesistentes

1. Irídio interfere na determinação.

De acordo com

DIN 38406-E1
Standard Method 3500-Fe-1997
US EPA 40 CFR 136

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[9] Reagente captura a maioria dos óxidos de ferro

Ferro (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Material

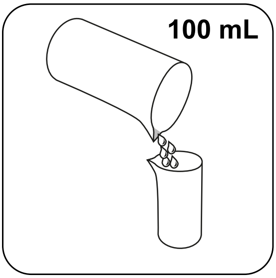
Material necessário (parcialmente opcional):

Reagentes	Unidade de Embalagem	Código do Produto
Iron VARIO TPTZ F10	Pó / 100 pc.	530550

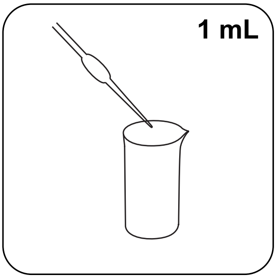
Preparação

1. A determinação de ferro total requer uma digestão. O reagente TPTZ capta a maioria de óxidos de ferro sem digestão.
2. Enxaguar todos os vidros para laboratório, antes da análise, com solução de ácido clorídrico diluído (1:1) e depois com água desmineralizada, para eliminar os depósitos de ferro, que podem causar resultados ligeiramente aumentados.
3. As águas fortemente alcalinas ou ácidas deviam, antes da análise, ser ajustadas para um valor pH entre 3 e 8 (com 0,5 mol/l de ácido sulfúrico ou 1 mol/l soda cáustica).
4. As águas que foram tratadas com compostos orgânicos como proteção anticorrosiva, etc. têm de ser eventualmente oxidadas para destruir os complexos de ferro. Para isso, transfere-se uma amostra de 100 ml com 1 ml de ácido sulfúrico concentrado e 1 ml de ácido nítrico concentrado e evaporada para metade. Depois de arrefecer, passa-se à digestão.

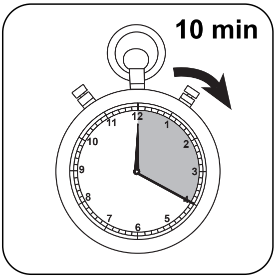
Digestão



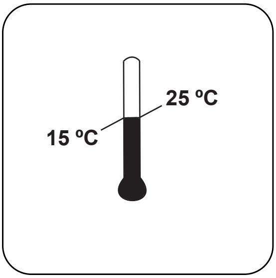
Encher um recipiente de amostra adequado com **100 mL de amostra** .



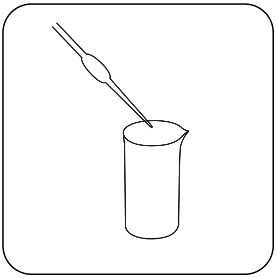
Adicionar **1 mL ácido sulfúrico concentrado** .



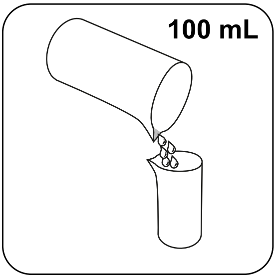
A amostra deve **aquecer durante 10 minutos,** ou até tudo se ter totalmente dissolvido.



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



Ajustar o **valor pH** da amostra com **solução amoniacal para 3-5**.



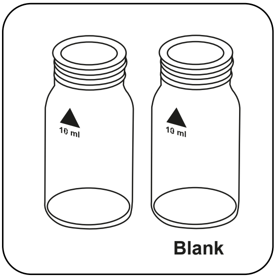
Encher a amostra com **água desmineralizada até 100 mL** .

Usar esta amostra para a análise de total de ferro solvido e dissolvido.

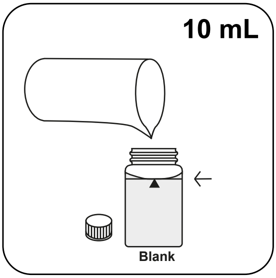
Realização da determinação Ferro, total com pacote de pó Vario

Escolher o método no equipamento.

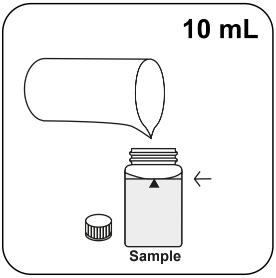
Para a determinação de **Ferro total** deve realizar a **digestão** descrita.



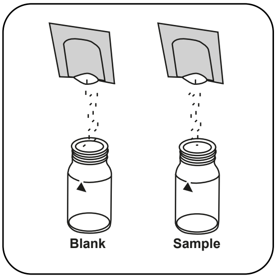
Preparar duas células de 24 mm limpas. Identificar uma célula como célula zero.



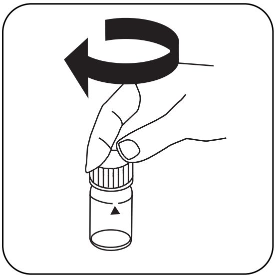
Adicionar **10 mL de água desmineralizada** à célula zero.



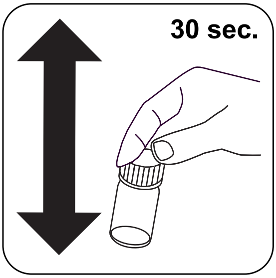
Adicionar **10 mL de amostra** à célula de amostra.



Introduzir em cada célula **um pacote de pó Vario IRON TPTZ F10**.



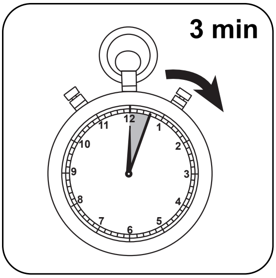
Fechar a(s) célula(s).



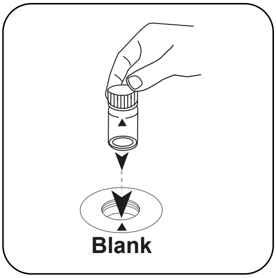
Misturar o conteúdo girando (30 sec.).

↵

Premir a tecla **ENTER**.



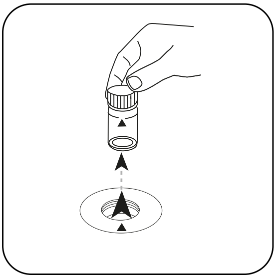
Aguardar **3 minuto(s) de tempo de reação**.



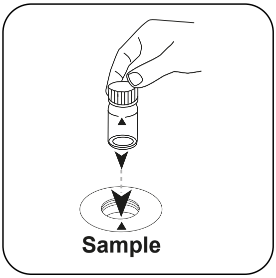
Colocar a **célula zero** no compartimento de medição. Observar o posicionamento.

Zero

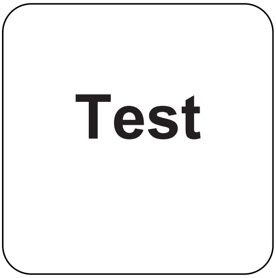
Premir a tecla **ZERO**.



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 Ferro.

Método Químico

TPTZ

Apêndice

Texto de Interferências

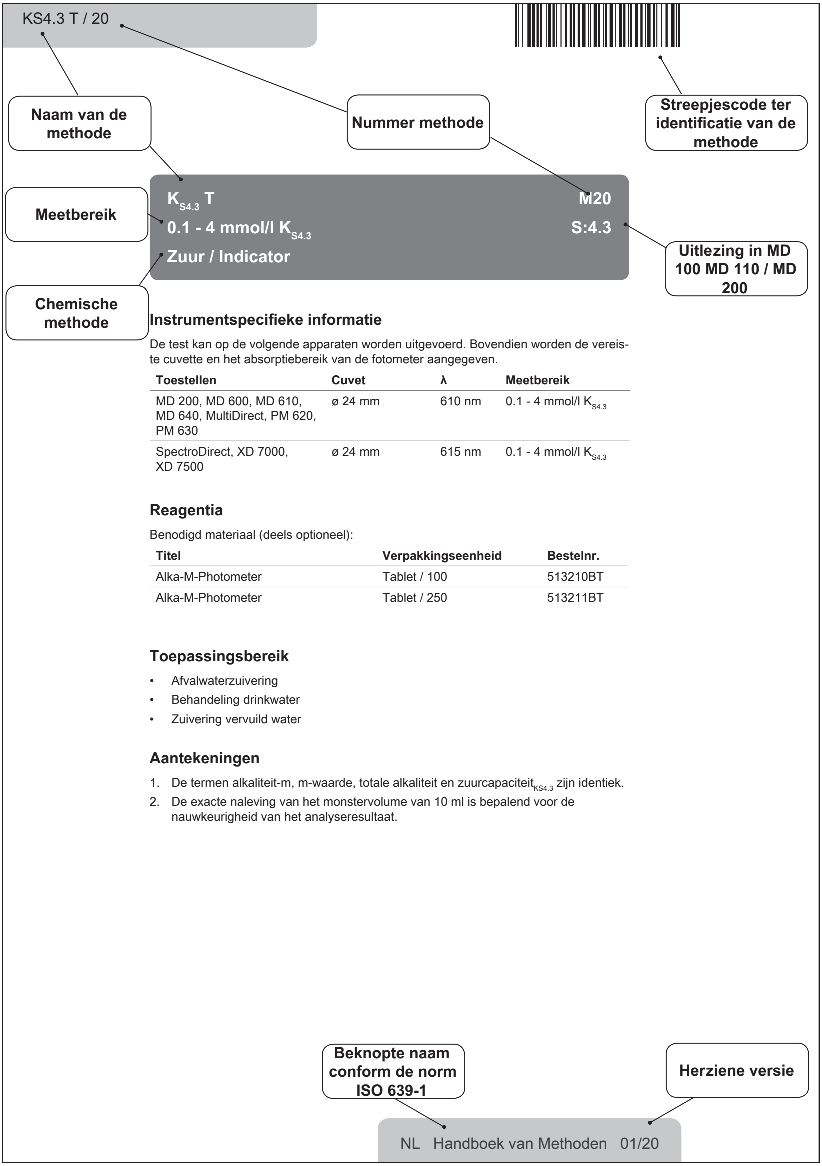
Interferências Pesistentes

Em caso de interferência, a formação de cor é inibida ou pode formar-se um sedimento. As indicações referem-se a um padrão com uma concentração de ferro de 0,5 mg/L.

Interferências	a partir de / [mg/L]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Bibliografia

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ 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

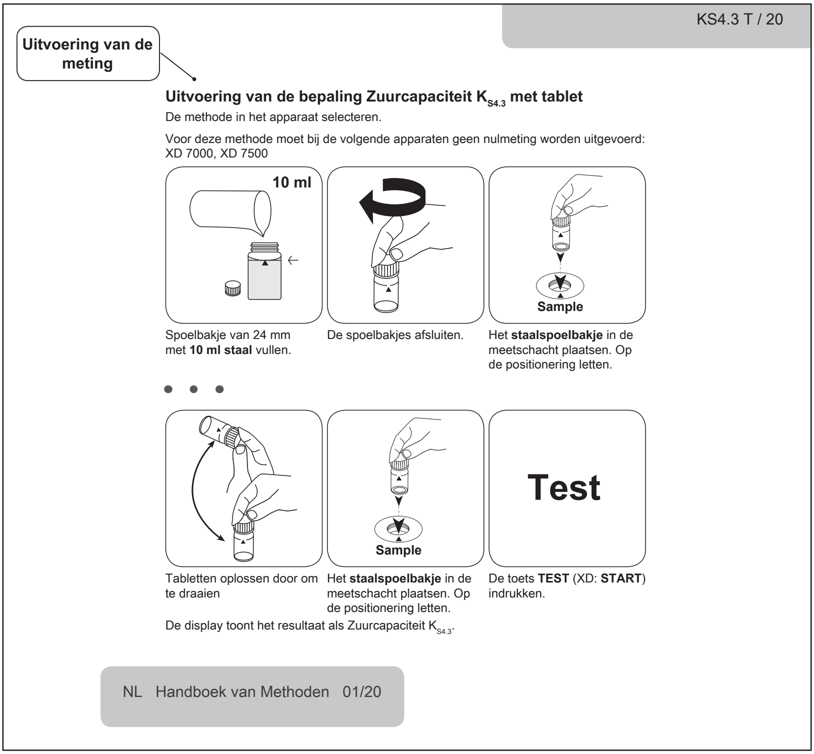
Toepassingsbereik

- 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.

NL Handboek van Methoden 01/20



KS4.3 T / 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 $K_{S4.3}$.

NL Handboek van Methoden 01/20

IJzer T M220

0.02 - 1 mg/L Fe FE

Ferrozine / Thioglycolaat

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
IJzer II LR (Fe^{2+})	Tablet / 100	515420BT
IJzer II LR (Fe^{2+})	Tablet / 250	515421BT
IJzer LR (Fe^{2+} und Fe^{3+})	Tablet / 100	515370BT
IJzer LR (Fe^{2+} und Fe^{3+})	Tablet / 250	515371BT

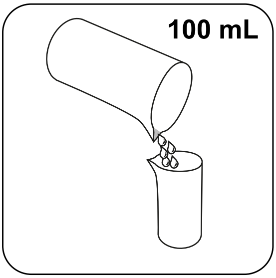
Voorbereiding

1. Water dat is behandeld met organische verbindingen als corrosiebescherming e.d. moet mogelijk worden geoxideerd worden om de ijzercomplexen te vernietigen. Hiertoe wordt een monster van 100 ml gemengd met 1 ml geconcentreerd zwavelzuur (≥ 95 %) en 1 ml geconcentreerd salpeterzuur (≥ 65 %) en op de helft ingedampt. Na afkoeling wordt de vertering uitgevoerd.

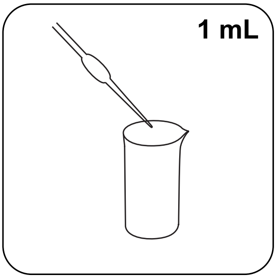
Aantekeningen

1. Deze methode bepaalt het totaal opgeloste Fe^{2+} en Fe^{3+}.
2. Voor de bepaling van Fe^{2+} wordt het IRON (II) LR-tablet gebruikt in plaats van het IRON LR-tablet.

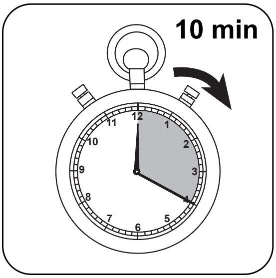
Ontsluiting



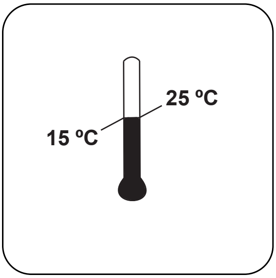
Een geschikte staalbeker met **100 mL staal** vullen.



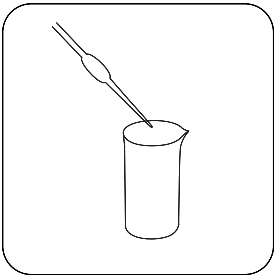
1 mL geconcentreerd zwavelzuur (≥ 95 %) toevoegen.



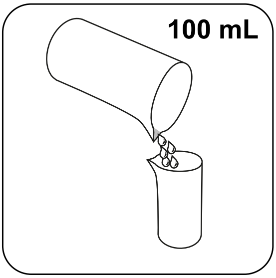
Het staal gedurende **10 minuten verwarmen,** of zolang tot alles volledig is opgelost.



Het staal laten afkoelen tot **kamertemperatuur**.



De **pH-waarde** van het staal met **Ammoniakoplossing (10-25 %) afstellen op 3-5**.



Het staal met **gedeïoniseerd water tot 100 mL** vullen.

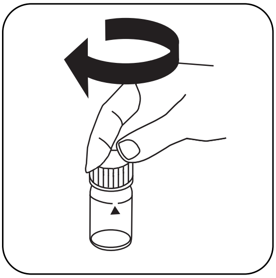
Dit staal gebruiken voor de analyse van totaal opgelost en niet-opgelost ijzer.

Uitvoering van de bepaling IJzer (II,III), opgelost met tablet

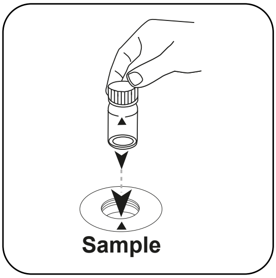
De methode in het apparaat selecteren.

Voor de bepaling van **opgelost en niet-opgelost ijzer** de beschreven **ontsluiting** uitvoeren.

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



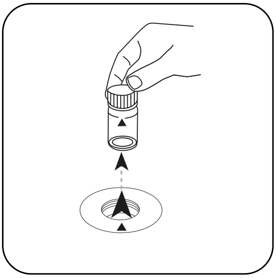
De spoelbakjes afsluiten.



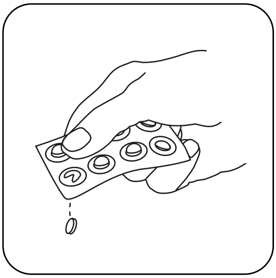
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.

Zero

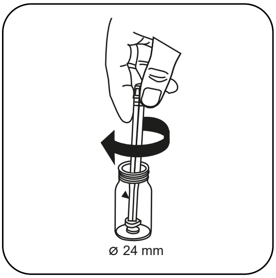
De toets **NUL** indrukken.



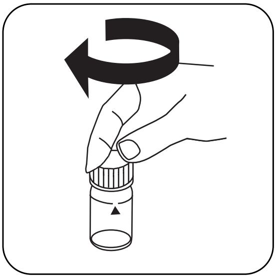
Het spoelbakje uit de meetschacht nemen.



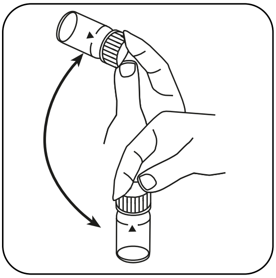
Een IRON LR tablet toevoegen.



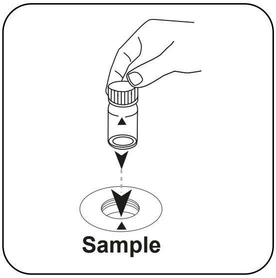
De tabletten onder lichte rotatie verpletteren.



De spoelbakjes afsluiten.



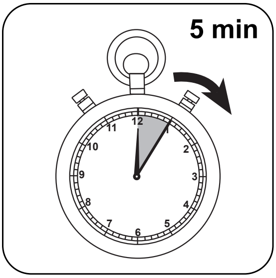
Tabletten oplossen door om te draaien



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

Test

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



De reactietijd van
5 minuten afwachten.

Na afloop van de reactietijd wordt de meting automatisch uitgevoerd.

De display toont het resultaat in mg/L IJzer.

Chemische methode

Ferrozine / Thioglycolaat

Aanhangsel

Verstoringen

Uit te sluiten verstoringen

1. De aanwezigheid van koper verhoogt het meetresultaat met 10 %. Bij een concentratie van 10 mg/L koper in het monster wordt het resultaat verhoogd met 1 mg/L ijzer.
   De verstoring kan worden geëlimineerd door toevoeging van thioureum

Validatie van de methodes

Aantoonbaarheidsgrens	0.01 mg/L
Bepaalbaarheidsgrens	0.016 mg/L
Einde meetbereik	1 mg/L
Gevoeligheid	0.92 mg/L / Abs
Betrouwbaarheidsgrenzen	0.013 mg/L
Standaardafwijking procedure	0.005 mg/L
Variatiecoefficient procedure	1.23 %

Literatuurverwijzing

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

IJzer PP M222

0.02 - 3 mg/L Fe$^{g)}$ FE1

1,10-fenantroline

Reagentia

Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
VARIO Ferro F10	Poeder / 100 St.	530560
VARIO Ferro F10	Poeder / 1000 St.	530563

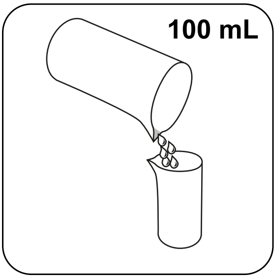
Voorbereiding

1. IJzeroxide vereist een zwakke, sterke of spijsverteringsvertering voor de analyse (zure vertering).
2. Zeer sterk alkalische of zure wateren moeten vóór de analyse op een pH-waarde tussen 3 en 5 worden ingesteld.
3. Voor monsters die zichtbare roest bevatten, moet een reactietijd van ten minste 5 minuten in acht worden genomen.
4. Water dat is behandeld met organische verbindingen als corrosiebescherming e.d. moet mogelijk worden geoxideerd worden om de ijzercomplexen te vernietigen. Hiertoe wordt een monster van 100 ml gemengd met 1 ml geconcentreerd zwavelzuur (≥ 95 %) en 1 ml geconcentreerd salpeterzuur (≥ 65 %) en op de helft ingedampt. Na afkoeling wordt de vertering uitgevoerd.

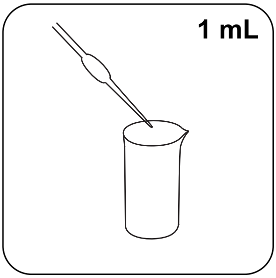
Aantekeningen

1. Deze methode bepaalt alle vormen van opgelost ijzer en de meeste vormen van onopgelost ijzer.
2. De nauwkeurigheid wordt niet verminderd door onopgelost poeder.

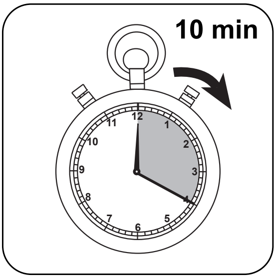
Ontsluiting



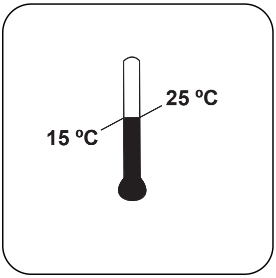
Een geschikte staalbeker met **100 mL staal** vullen.



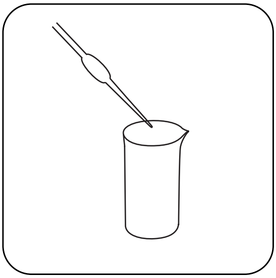
1 mL geconcentreerd zwavelzuur (≥ 95 %) toevoegen.



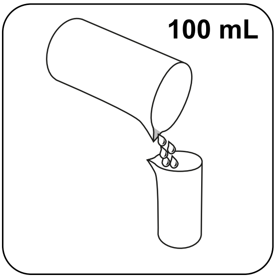
Het staal gedurende **10 minuten verwarmen,** of zolang tot alles volledig is opgelost.



Het staal laten afkoelen tot **kamertemperatuur**.



De **pH-waarde** van het staal met **Ammoniakoplossing (10-25 %) afstellen op 3-5**.



Het staal met **gedeïoniseerd water tot 100 mL** vullen.

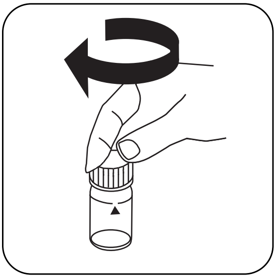
Dit staal gebruiken voor de analyse van totaal opgelost en niet-opgelost ijzer.

Uitvoering van de bepaling IJzer(II,III), opgelost met Vario-poederpakje

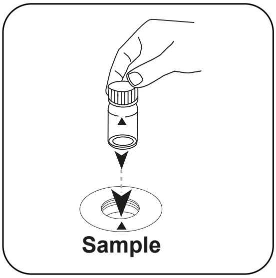
De methode in het apparaat selecteren.

Voor de bepaling van **IJzer met tablet** de beschreven **ontsluiting** uitvoeren.

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



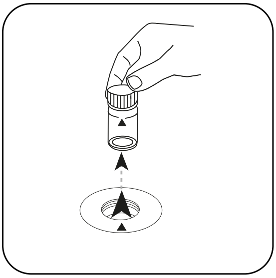
De spoelbakjes afsluiten.



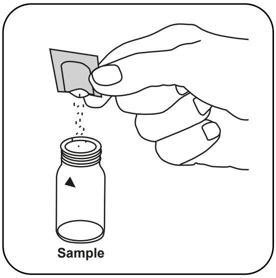
Het **staalspoelbakje** in de meetschacht plaatsen. Op de positionering letten.

Zero

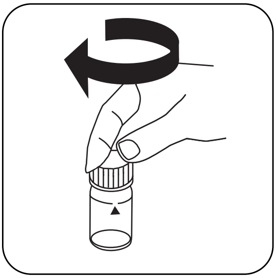
De toets **NUL** indrukken.



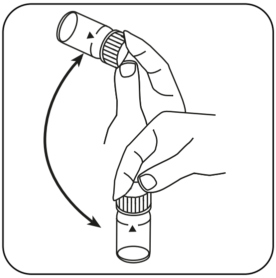
Het spoelbakje uit de meetschacht nemen.



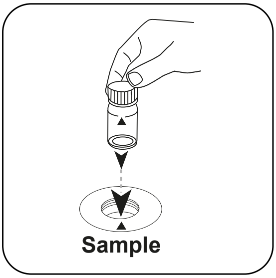
Een **Vario FERRO F10 poederpakje** toevoegen.



De spoelbakjes afsluiten.



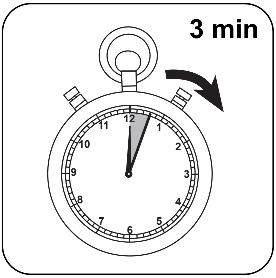
De inhoud mengen door om te draaien.



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

Test

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



De reactietijd van 3 minuten afwachten.

Na afloop van de reactietijd wordt de meting automatisch uitgevoerd.

De display toont het resultaat in mg/L IJzer.

Chemische methode

1,10-fenantroline

Aanhangsel

Verstoringen

Permanente verstoringen

1. Iridium verstoort de bestemming.

Overeenkomstig

DIN 38406-E1
Standaardmethode 3500-Fe-1997
US EPA 40 CFR 136

[9] reagens omvat de meeste ijzeroxiden

IJzer (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

Reagentia

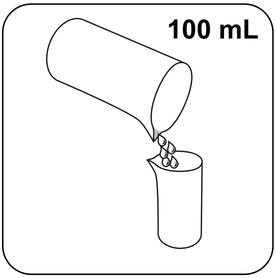
Benodigd materiaal (deels optioneel):

Reagentia	Verpakkingseenheid	Bestelnr.
VARIO IJzer TPTZ F10	Poeder / 100 St.	530550

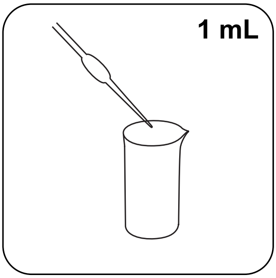
Voorbereiding

1. Voor de bepaling van het totale ijzergehalte is een spijsvertering nodig. Het TPTZ-reagens detecteert de meeste ijzeroxiden zonder spijsvertering.
2. Spoel vóór de analyse al het glaswerk in het laboratorium met verdund zoutzuur (1:1) en vervolgens met gedeïoniseerd water om ijzerdepots, die tot iets hogere resultaten kunnen leiden, te verwijderen.
3. Sterk alkalisch of zuur water moet vóór de analyse in een pH-gebied tussen 3 en 8 (met 0,5 mol/l zwavelzuur of 1 mol/l-natriumhydroxideoplossing) worden geplaatst.
4. Water dat is behandeld met organische verbindingen als corrosiebescherming e.d. moet mogelijk worden geoxideerd worden om de ijzercomplexen te vernietigen. Hiertoe wordt een monster van 100 ml gemengd met 1 ml geconcentreerd zwavelzuur (≥ 95 %) en 1 ml geconcentreerd salpeterzuur (≥ 65 %) en op de helft ingedampt. Na afkoeling wordt de vertering uitgevoerd.

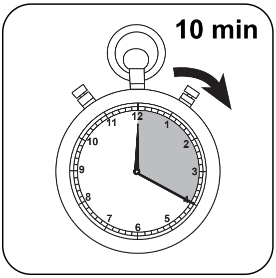
Ontsluiting



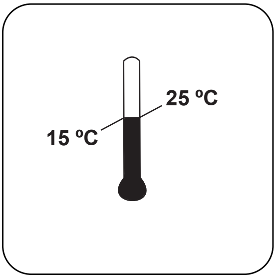
Een geschikte staalbeker met **100 mL staal** vullen.



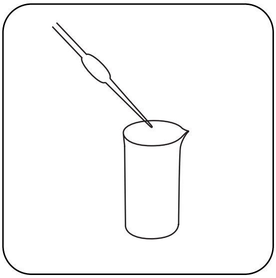
1 mL geconcentreerd zwavelzuur (≥ 95 %) toevoegen.



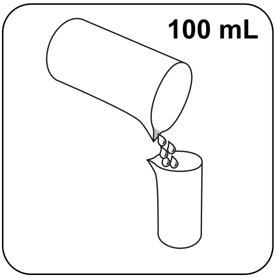
Het staal gedurende **10 minuten verwarmen,** of zolang tot alles volledig is opgelost.



Het staal laten afkoelen tot **kamertemperatuur**.



De **pH-waarde** van het staal met **Ammoniakoplossing (10-25 %) afstellen op 3-5**.



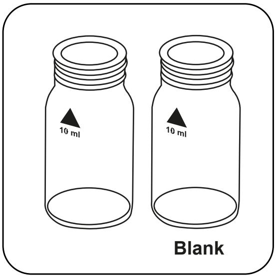
Het staal met **gedeïoniseerd water tot 100 mL** vullen.

Dit staal gebruiken voor de analyse van totaal opgelost en niet-opgelost ijzer.

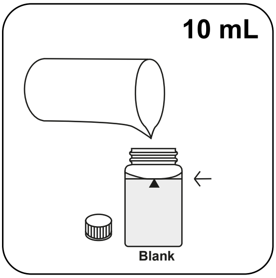
Uitvoering van de bepaling IJzer, totaal met Vario-poederpakje

De methode in het apparaat selecteren.

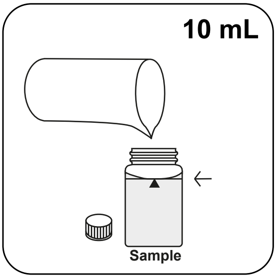
Voor de bepaling van **Totaal ijzer** de beschreven **ontsluiting** uitvoeren.



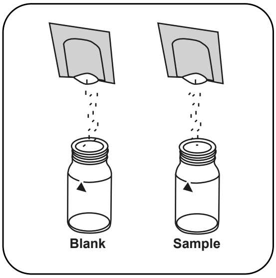
Twee propere spoelbakjes van 24 mm klaarzetten. Een als nulspoelbakje kenmerken.



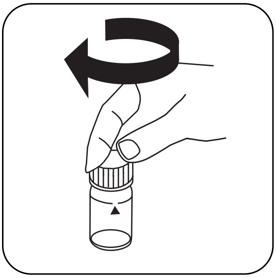
10 mL gedeïoniseerd water in het nulspoelbakje doen.



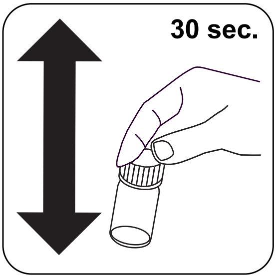
10 mL staal in het staalspoelbakje doen.



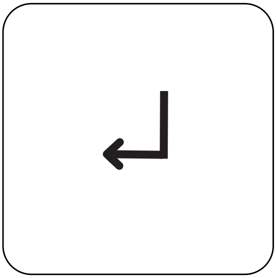
In elk spoelbakje **een Vario IRON TPTZ F10 poederpakje** doen.



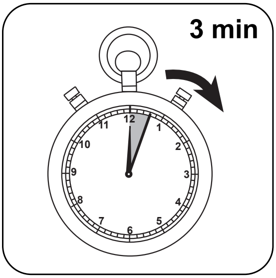
De spoelbakjes afsluiten.



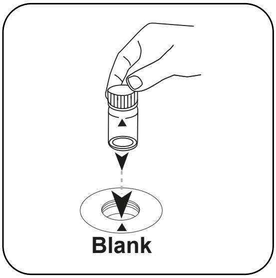
De inhoud mengen door te schudden (30 sec.).



De toets **ENTER** indrukken.



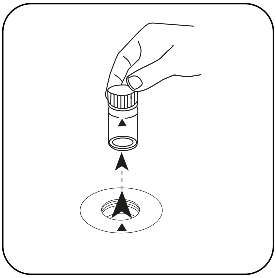
De reactietijd van 3 minuten afwachten.



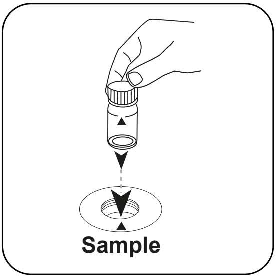
Het **nulspoelbakje** in de meetschacht plaatsen. Op de positionering letten.

Zero

De toets **NUL** indrukken.



Het spoelbakje uit de meetschacht nemen.



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

Test

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

De display toont het resultaat in mg/L IJzer.

Chemische methode

TPTZ

Aanhangsel

Verstoringen

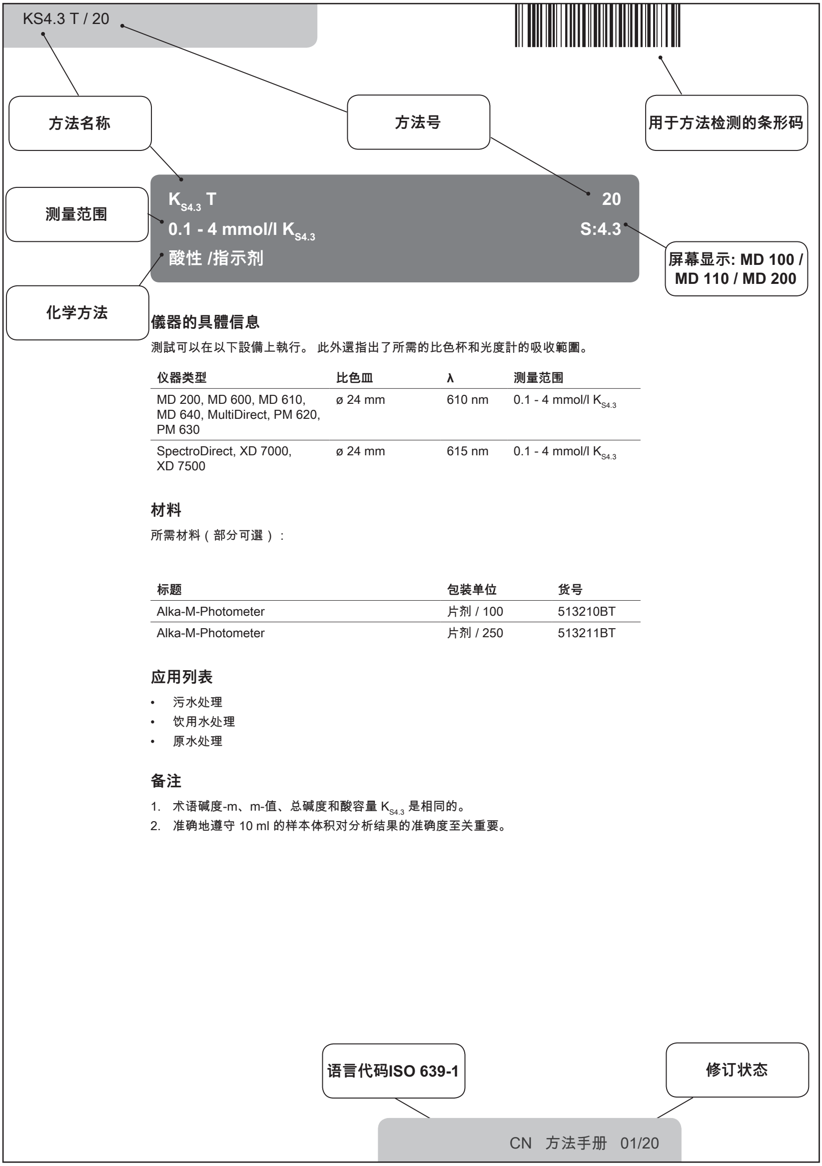
Permanente verstoringen

Als er storingen optreden, wordt de kleurvorming geremd of worden er neerslagvormen gevormd. De gegevens hebben betrekking op een norm met een ijzerconcentratie van 0,5 mg/L.

Verstoringen	verstoort vanaf
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

Literatuurverwijzing

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed. (1980)



KS4.3 T / 20

$K_{S4.3}$ T **20**

0.1 - 4 mmol/l $K_{S4.3}$ **S:4.3**

酸性 /指示剂

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

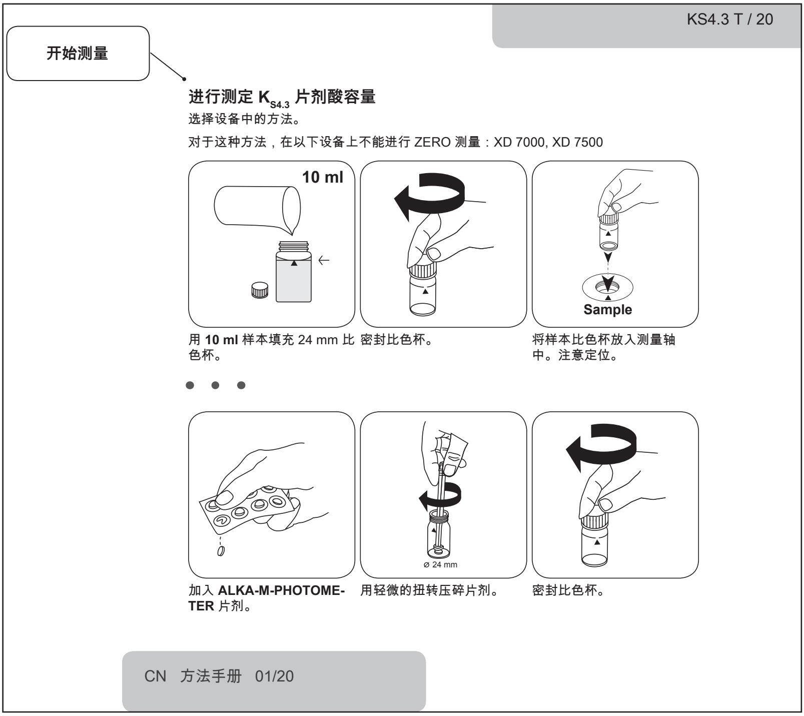
应用列表

- 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。

CN 方法手册 01/20



KS4.3 T / 20

开始测量

进行测定 $K_{S4.3}$ 片剂酸容量

选择设备中的方法。

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

用 **10 ml** 样本填充 24 mm 比色杯。

密封比色杯。

将样本比色杯放入测量轴中。注意定位。

● ● ●

加入 **ALKA-M-PHOTOMETER** 片剂。

用轻微的扭转压碎片剂。

密封比色杯。

CN 方法手册 01/20

T 铁 M220

0.02 - 1 mg/L Fe FE

Ferrozine/巯乙酸盐

材料

所需材料（部分可選）：

试剂	包装单位	货号
铁 II LR (Fe^{2+})	片剂 / 100	515420BT
铁 II LR (Fe^{2+})	片剂 / 250	515421BT
铁 LR (Fe^{2+} und Fe^{3+})	片剂 / 100	515370BT
铁 LR (Fe^{2+} und Fe^{3+})	片剂 / 250	515371BT

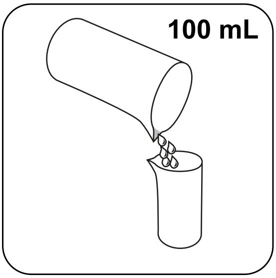
准备

1. 在必要情况下，已用有机化合物作为腐蚀抑制剂处理的水须被氧化，从而破坏铁复合物。为此，将 100 ml 样本与 1 ml 浓硫酸和 1 ml 浓硝酸混合并蒸发至一半。冷却后进行消解。

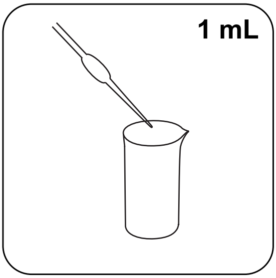
备注

1. 用这种方法测定总溶解的 Fe^{2+} 和 Fe^{3+}。
2. 为了测定 Fe^{2+} ，使用 IRON（II）LR 片剂代替 IRON LR 片剂。

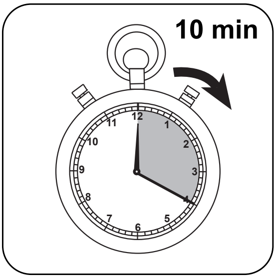
消解



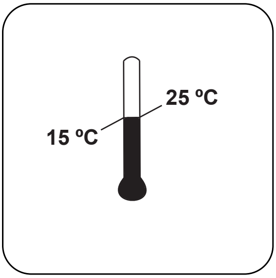
用 **100 mL 样本**填充合适的样本容器。



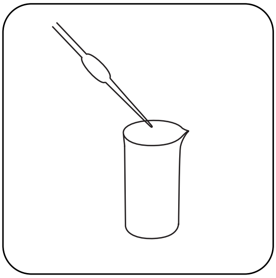
加入 **1 mL 浓硫酸 (≥ 95 %)** 。



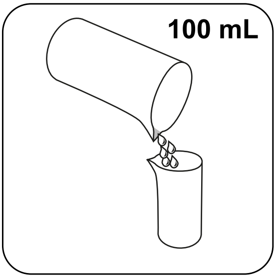
将样本**加热 10 分钟** ，或一直加热直到其完全溶解。



将样本冷却到**室温**。



将样本的 **pH 值**从 **氨溶液 (10-25 %) 调节到 3-5**。



将样本用**去离子水填充至 100 mL** 。

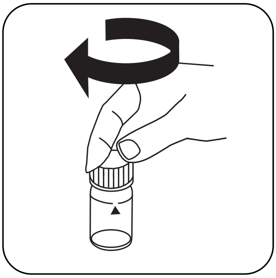
使用该样本来分析 总溶解铁。

进行测定 铁（II,III），用片剂溶解

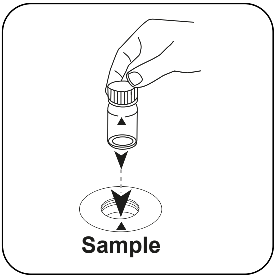
选择设备中的方法。

为了测定 **溶解和未溶解铁，进行** 中所述的**消解**。

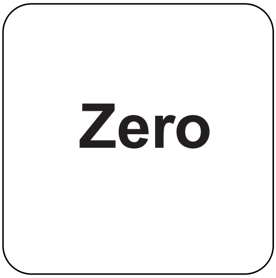
用 **10 mL 样本**填充 24 mm 比色杯。



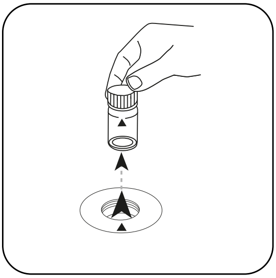
密封比色杯。



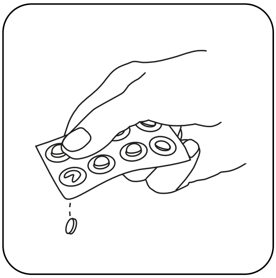
将**样本比色杯**放入测量轴中。注意定位。



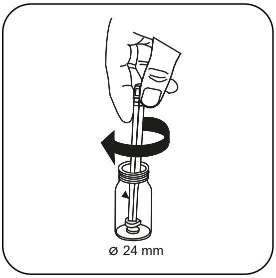
按下 **ZERO** 按钮。



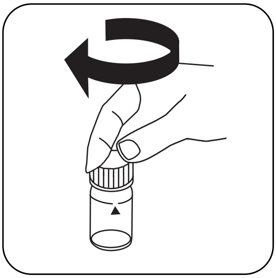
从测量轴上取下比色杯。



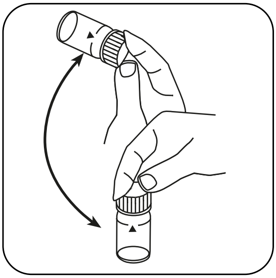
加入 **IRON LR 片剂**。



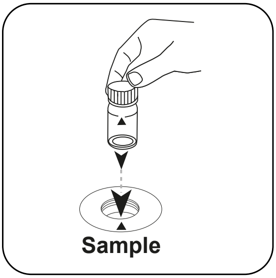
用轻微的扭转压碎片剂。



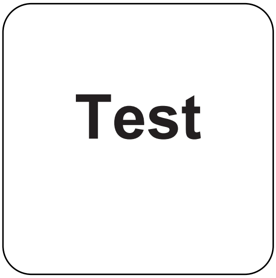
密封比色杯。



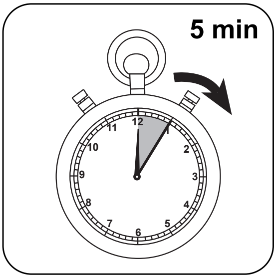
通过旋转溶解片剂。



将**样本比色杯**放入测量轴中。注意定位。



按下 **TEST** (XD: **START**) 按钮。



等待 **5 分钟反应时间** 。

反应时间结束后，自动进行测量。

结果在显示屏上显示为 mg / l 铁。

化学方法

Ferrozine/巯乙酸盐

附錄

干扰说明

可消除干扰

1. 铜的存在使测量结果增加了 10 %。样本中铜浓度为 10 mg/L 时，测量结果增加 1 mg/L 铁。
   干扰可以通过添加硫脲来消除

方法验证

检出限	0.01 mg/L
测定下限	0.016 mg/L
测量上限	1 mg/L
灵敏度	0.92 mg/L / Abs
置信范围	0.013 mg/L
标准偏差	0.005 mg/L
变异系数	1.23 %

参考文献

Photometrische Analyse, Lange/ Vjedelek, Verlag Chemie 1980, S. 102

PP 铁 M222

0.02 - 3 mg/L Fe[g)] FE1

1,10-邻菲罗啉

材料

所需材料（部分可選）：

试剂	包装单位	货号
VARIO 铁 F10	粉剂 / 100 片	530560
VARIO 铁 F10	粉剂 / 1000 片	530563

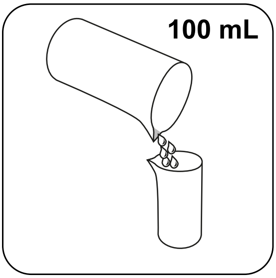
准备

1. 在分析前氧化铁需要一个弱、强或 Digesdahl 消解（酸消解方法）。
2. 在分析前应将强碱性或酸性水的 pH 值调节到 3 和 5 之间。
3. 对于含有可见锈的样本，应保持至少 5 分钟的反应时间。
4. 在必要情况下，已用有机化合物作为腐蚀抑制剂处理的水须被氧化，从而破坏铁复合物。为此，将 100 ml 样本与 1 ml 浓硫酸和 1 ml 浓硝酸混合并蒸发至一半。冷却后进行消解。

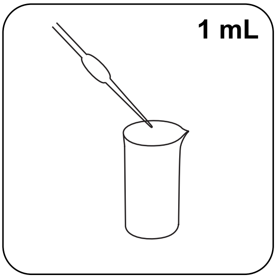
备注

1. 用这种方法测定所有形式的溶解铁和大部分形式的未溶解铁。
2. 准确度不会因未溶解的粉末而降低。

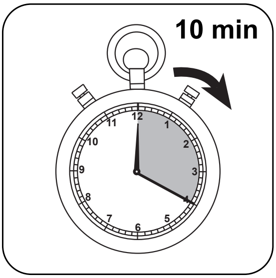
消解



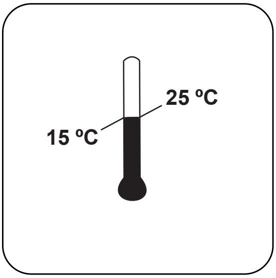
用 **100 mL 样本**填充合适的样本容器。



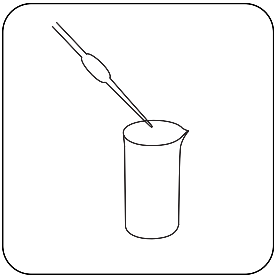
加入 **1 mL 浓硫酸 (≥ 95 %)** 。



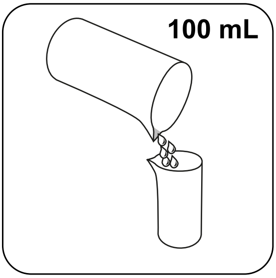
将样本**加热 10 分钟** ，或一直加热直到其完全溶解。



将样本冷却到**室温**。



将样本的 **pH 值**从 **氨溶液 (10-25 %) 调节到 3-5**。



将样本用**去离子水填充至 100 mL** 。

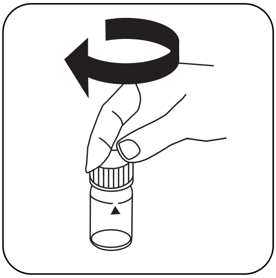
使用该样本来分析 总溶解铁。

进行测定 铁（II,III），用 Vario 粉包溶解

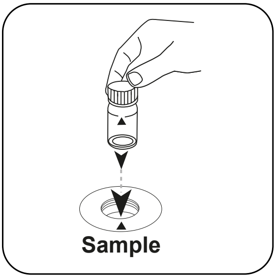
选择设备中的方法。

为了测定 **铁 片剂法，进行** 中所述的**消解**。

用 **10 mL 样本**填充 24 mm 比色杯。



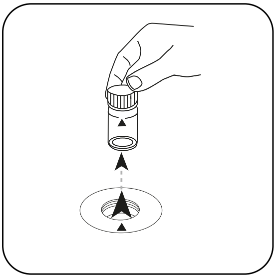
密封比色杯。



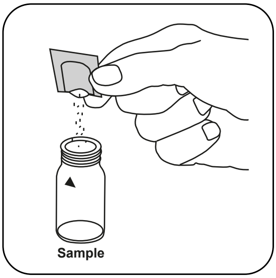
将**样本比色杯**放入测量轴中。注意定位。

Zero

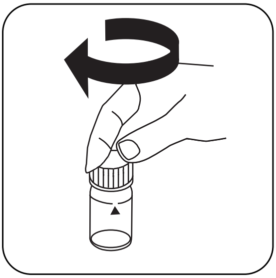
按下 **ZERO** 按钮。



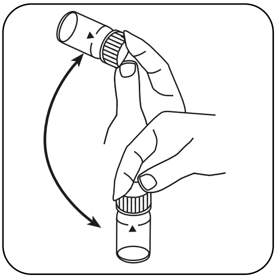
从测量轴上取下比色杯。



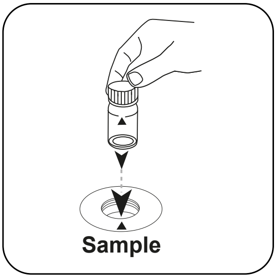
加入 **Vario FERRO F10 粉包** 。



密封比色杯。



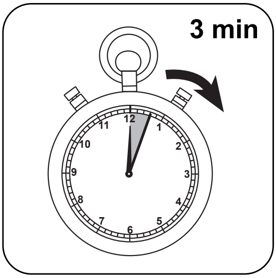
通过旋转混合内容物。



将**样本比色杯**放入测量轴中。注意定位。

Test

按下 **TEST** (XD: **START**) 按钮。



等待 **3 分钟反应时间** 。

反应时间结束后，自动进行测量。

结果在显示屏上显示为 mg / l 铁。

化学方法

1,10-邻菲罗啉

附錄

干扰说明

持续干扰

1. 铱干扰测量。

参照

DIN 38406-E1
标准方法 3500-Fe-1997
US EPA 40 CFR 136

[9] 试剂可测定大部分未溶解铁氧化物，无消解

铁 (TPTZ) PP M223

0.02 - 1.8 mg/L Fe FE2

TPTZ

材料

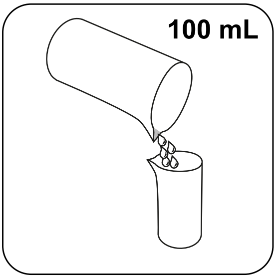
所需材料（部分可選）：

试剂	包装单位	货号
VARIO 铁 TPTZ F10	粉剂 / 100 片	530550

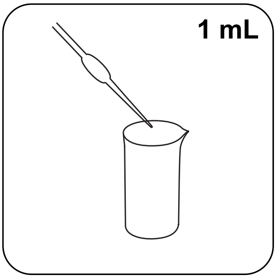
准备

1. 总铁的测定需要消解。TPTZ 试剂检测到大多数氧化铁不消解。
2. 在分析前用稀盐酸溶液（1:1）冲洗所有的实验室玻璃器皿，然后用去离子水冲洗除去铁沉积物，这可能导致结果轻微较高。
3. 在分析前（用 0.5 mol/l 硫酸或 1 mol/l 氢氧化钠溶液）应将强碱性或酸性水的 pH 范围调节到 3 和 8 之间。
4. 在必要情况下，已用有机化合物作为腐蚀抑制剂处理的水须被氧化，从而破坏铁复合物。为此，将 100 ml 样本与 1 ml 浓硫酸和 1 ml 浓硝酸混合并蒸发至一半。冷却后进行消解。

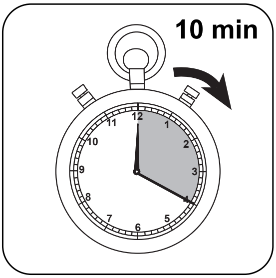
消解



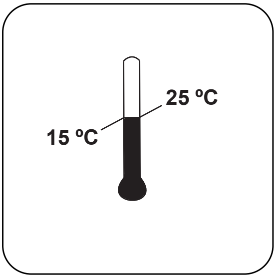
用 **100 mL 样本**填充合适的样本容器。



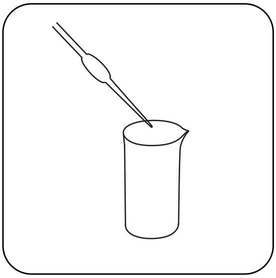
加入 **1 mL 浓硫酸 (≥ 95 %)**。



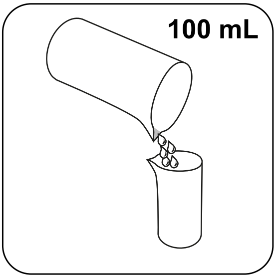
将样本**加热 10 分钟**，或一直加热直到其完全溶解。



将样本冷却到**室温**。



将样本的 **pH 值**从 **氨溶液 (10-25 %) 调节到 3-5**。



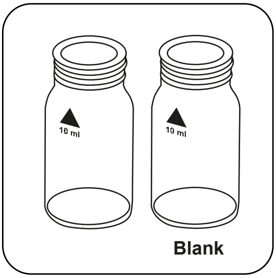
将样本用**去离子水填充至 100 mL**。

使用该样本来分析 总溶解铁。

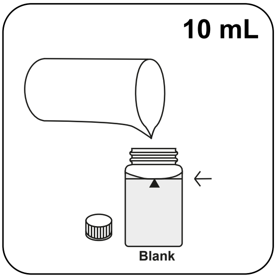
进行测定 铁，总 Vario 粉包

选择设备中的方法。

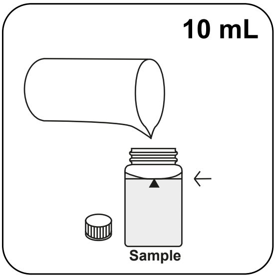
为了测定 **总铁，进行** 中所述的**消解**。



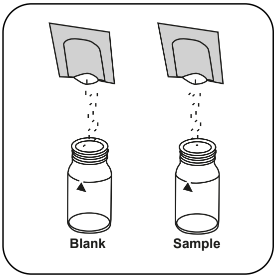
准备两个干净的 24 mm 比色杯。将一个比色杯标记为空白比色杯。



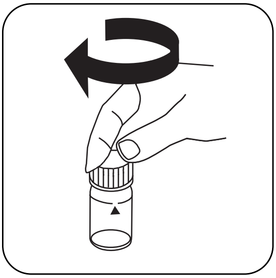
加入 **10 mL 去离子水**到比色杯中。



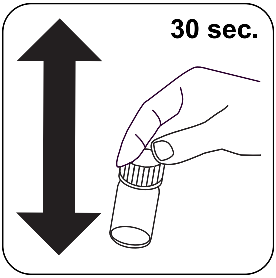
加入 **10 mL 样本**到样本比色杯中。



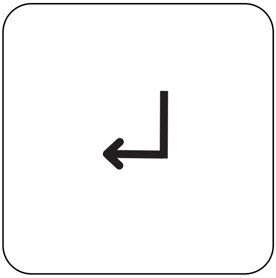
在每个比色杯中加入一**个 Vario IRON TPTZ F10 粉包** 。



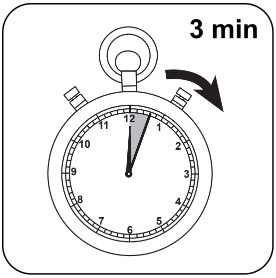
密封比色杯。



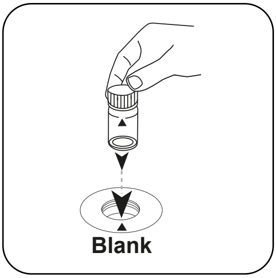
通过摇晃混合内容物（30 sec.）。



按下 **ENTER** 按钮。



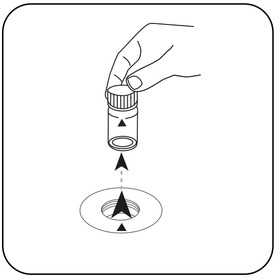
等待 **3 分钟反应时间** 。



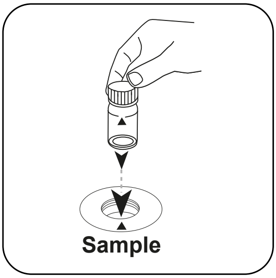
将**空白比色杯**放入测量轴中。注意定位。

Zero

按下 **ZERO** 按钮。



从测量轴上取下比色杯。



将**样本比色杯**放入测量轴中。注意定位。

Test

按下 **TEST** (XD: **START**)
按钮。

结果在显示屏上显示为 mg / l 铁。

化学方法

TPTZ

附錄

干扰说明

持续干扰

出现干扰时，颜色形成被抑制或形成沉淀。 说明是指铁浓度为 0.5 mg/L 的标准。

干擾	從/ [mg/l]
Cd	4
Cr^{3+}	0.25
Cr^{6+}	1.2
Co	0.05
Cu	0.6
CN^-	2.8
Mn	50
Hg	0.4
Mo	4
Ni	1
NO_2^-	0.8

参考文献

G. Frederic Smith Chemical Co., The Iron Reagents, 3rd ed.(1980)

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