



COD 200
Portable Chemical Oxygen Demand Colorimeter

Instruction Manual

99561-84



Environmental Express
www.environmentalexpress.com

Important Information

Important Information for consumers in the EU:
Disposal instructions for batteries and accumulator:



EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows : Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.

Disposal instructions for electrical equipment



Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! We will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Environmental Express instrument for disposal freight prepaid to your supplier.

Safety - General Instructions

The manufacturer's liability and warranty for damage and consequential damages lapses with improper use, failure to follow this operating manual, use of insufficiently qualified specialized personnel or unauthorized changes to the instrument. The manufacturer is not liable for costs or damages that arise for the user or third parties due to the use of this instrument, especially in case of improper use of the instrument or misuse or faults in the connection or of the instrument. The manufacturer assumes no liability for print errors.

Safety information in the operating manual

This operating manual provides important information on the safe operation of the product. Read this operating manual thoroughly and make yourself familiar with the product before putting it into operation or working with it. The operating manual must be kept in the vicinity of the product so you can always find the information you need.

Guidelines for colorimetric measurements

1. Vials, caps and stirring rods should be cleaned thoroughly after each analysis to prevent interference. Even minor reagent residues can cause errors in the test result.
2. The outside of the vial must be clean and dry before starting the analysis. Clean the outside of the vials with a towel to remove fingerprints or other marks.
3. Zero calibration and test must be carried out with the same vial as there may be slight differences in optical performance between vials.
4. The vials must be positioned in the sample chamber for zeroing and test with the mark on the vial aligned with the mark on the instrument.
5. Always perform zeroing and test with the vial cap tightly closed. Only use the cap with a sealing ring.
6. Bubbles on the inside wall of the vial lead to incorrect measurements. To prevent this, remove the bubbles by swirling the vial before performing the test.
7. Avoid spillage of water into the sample chamber because this can lead to incorrect test results.
8. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using lint-free, moist cloths (oil-free) or cotton buds.
9. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
10. To avoid errors caused by stray light do not use the instrument in bright sunlight.
11. Always add the reagent tablets to the water sample straight from the foil without touching them with the fingers.
12. The reagents must be added in the correct sequence.

Method Notes

1. Prior to measurement ensure that the sample is suitable for analysis (no major interferences and does not require any preparation i.e. pH adjustment, filtration etc)
2. Different Refill Packs available on request.
3. Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
4. Ensure proper disposal of reagent solutions.
5. Material Safety Data Sheets are available on request or for immediate download on the web: www.environmentalexpress.com

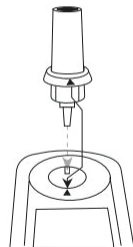
Technical Specifications

Instrument	automatic wavelength selection, direct reading colorimeter
Light source	LEDs, interference filters (IF) and photo- sensor in transparent cell chamber
Photometric Range	-2600 - 2600 mAbs
Operating Wavelength	430 nm $\Delta\lambda = 5$ nm 610 nm $\Delta\lambda = 6$ nm
Wavelength accuracy	± 1 nm
Photometric accuracy*	3 % FS (T = 20 °C – 25 °C)
Photometric resolution	0.01 A
Auto-OFF	automatic switch off 25 minutes after last keypress (different reaction times depend- ing on available method)
Display	backlit LCD (on keypress)
Time	real time clock and date
Calibration	user and factory calibration resetting to factory calibration possible
Ambient conditions	temperature: 5– 40 °C rel. humidity: 30–90 % (non-condensing)
Waterproof	floating; as defined in IP 68 (1 hour at 0.1 meter)
CE	Certificate for Declaration of CE-Conformity available for download at:

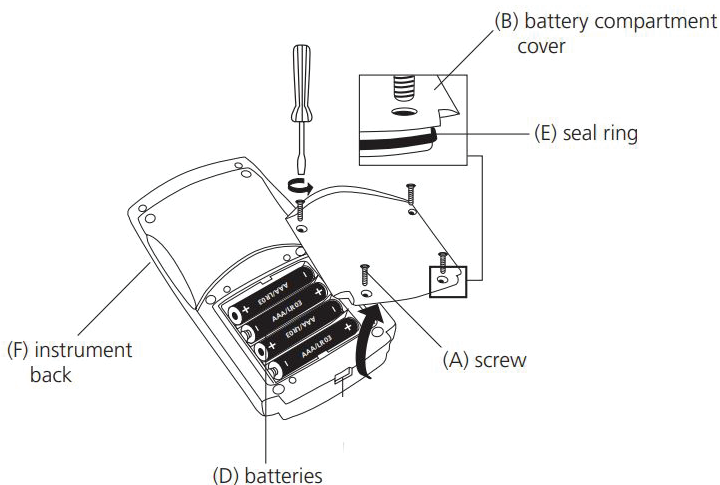
*measured with standard solutions

Guidelines for colorimetric measurements

**Positioning
the adapter:**



Replacement of batteries:



CAUTION:

To ensure that the instrument is waterproof:

- seal ring (E) must be in position
- battery compartment cover (B) must be fixed with the four screws

If the batteries are removed for more than one minute the date and time menu starts automatically when the colorimeter is switched on the next time.



2 3 Setting date and time (24-hour-format)

Retrieve menu (see "Retrieve menu")

2x press = arrow symbols on Time & Date

confirm

Increase value

Decrease value

Confirm the respective setting

"IS SET" appears on the display after the final confirmation.

The instrument returns to the measurement mode.



Function Descriptions

OTZ (One Time Zero)

The One Time Zero is available for all photometer variants whereby the zero adjustment is carried out in a 24-mm round vial with sample water. It can be used if different tests are carried out with identical test conditions and the same water sample. The zero adjustment is saved until the device is switched off.

The zero setting can be repeated each time if necessary



One Time Zero (OTZ), 1x performing zero, then parameter measurement



Repeating the zero, Press the key for 2 seconds.

Countdown / reaction period

For methods with a reaction time, a countdown function can be switched on during the test for some methods.

press and hold

press

release

Countdown/reaction time runs, measurement takes place automatically after the time runs out.

Interrupt countdown/reaction time



Attention:

Non-compliance with reaction periods leads to incorrect test results.

Sample Preparation

Removal of high Chloride concentration in COD samples

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

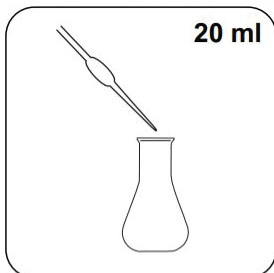
Equipment:

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

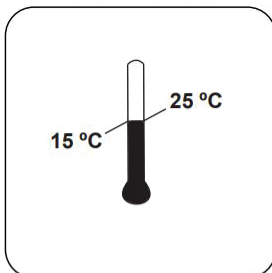
Reagents:

- 12 to 14 g of sodalime
- 50 ml H₂SO₄
(95 - 97%, 1.84 g/ml, CSB free)
- Hydrochloric acid 10 % to clean absorber from residual lime

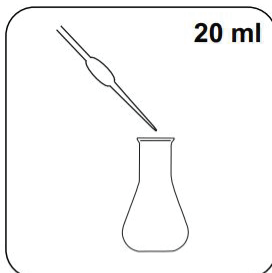
The work must be carried out under a fume hood!



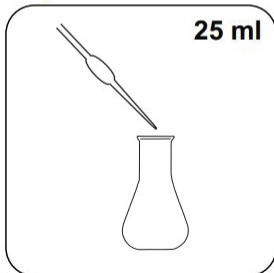
Put **20 ml homogenised sample** in the erlenmeyer flask.



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



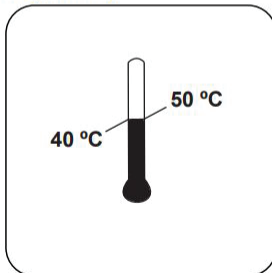
Put **20 ml deionized water** in the second erlenmeyer flask.



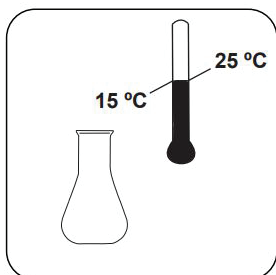
Add slowly **25 ml concentrated Sulfuric acid** each under cooling and stirring.



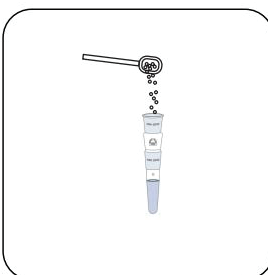
Sample will be hot!



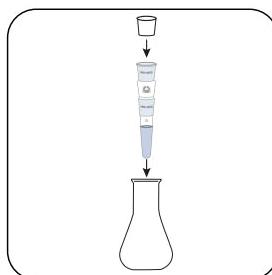
Temperature should not exceed 40 to 50 °C.



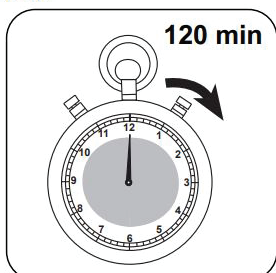
After the complete addition of the sulfuric acid, cool to room temperature in the ice bath.



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



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



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

This sample is used for the analysis of COD. Due to this pretreatment procedure the original sample has been diluted by a factor of 2.05.

$$CSB_{\text{sample}} = CSB_{\text{display}} \times 2.05$$

COD LR**3 - 150 mg/L COD****LR****Dichromate / H₂SO₄****Method information**

Instrument Name	Cuvette	Wavelength	Measuring Range
COD 200 Colorimeter	ø 16 mm - prefilled vial	430 nm	3 - 150 mg/l COD

Required Materials

Description	Part Number
COD 200 Colorimeter	99561-84
Environmental Express® HotBlock COD Reactor, 115 VAC	EW-35200-99
Environmental Express® HotBlock COD Reactor, 240 VAC	EW-35201-99
Disposable Syringe, Non-Sterile, Slip-Tip, 3 mL, 100/Pk	EW-07944-04
16 MM Tube Adapter	99562-13

Required Reagents / Chemistries:

Description	Part Number
COD Reagent, LR	25 Pack 99562-05
DI Water	2 ML EW-88401-21

Sampling

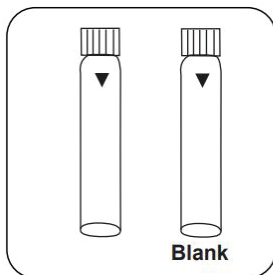
1. In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. See "Sample Preparation" Section for notes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

Notes About Method

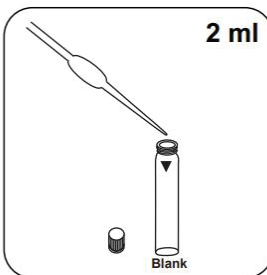
1. The blank is stable when stored in the dark.
2. Blanks and test vials must be from the same batch.
3. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Measuring

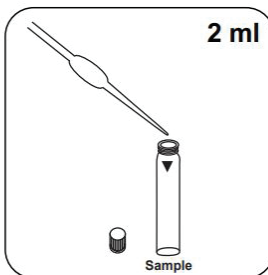
1. Select the method on the device: LR



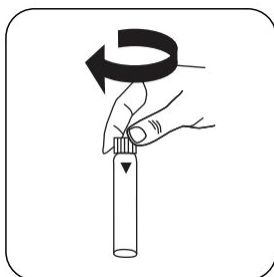
Prepare two reaction vials.
Mark one as a blank.



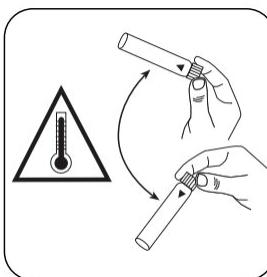
Put **2 ml deionised water**
in the blank



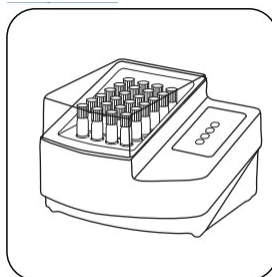
Put **2 ml sample** in the
sample vial.



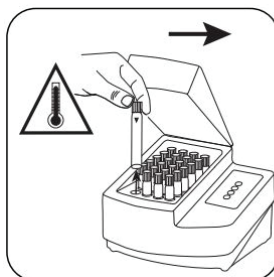
Close vials.



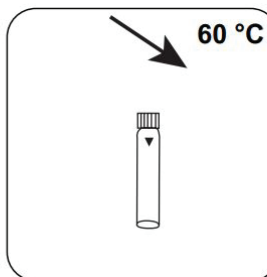
Carefully invert several
times to mix the contents.
Note: Will get hot!



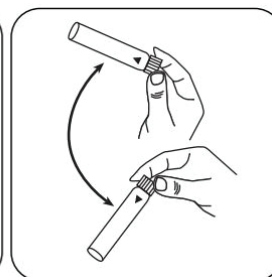
Seal the vials in the pre-
heated thermoreactor for
120 minutes at 150°C



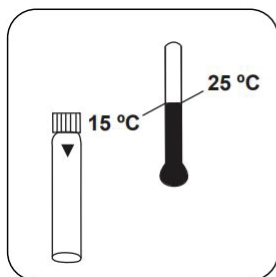
Remove the vial from the
thermoreactor. (**Note: vial
will be hot!**)



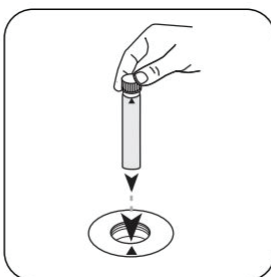
Allow vial(s) to cool to 60
°C.



Invert several times to mix
the contents.



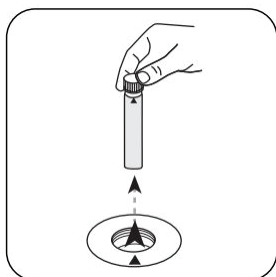
Allow the vial to cool to room temperature and then measure.



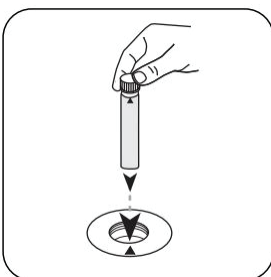
Place blank in the sample chamber. • Pay attention to the positioning.

Zero

Press the **ZERO** button



Remove vial from the sample chamber.



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

Test

Press the **TEST** button

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

COD LMR**15 - 300 mg/L COD****LMR****Dichromate / H_2SO_4** **Method information**

Instrument Name	Cuvette	Wavelength	Measuring Range
COD 200 Colorimeter	ø 16 mm - prefilled vial	430 nm	15 - 300 mg/l COD

Required Materials

Description	Part Number
COD 200 Colorimeter	99561-84
Environmental Express® HotBlock COD Reactor, 115 VAC	EW-35200-99
Environmental Express® HotBlock COD Reactor, 240 VAC	EW-35201-99
Disposable Syringe, Non-Sterile, Slip-Tip, 3 mL, 100/Pk	EW-07944-04
16 MM Tube Adapter	99562-13

Required Reagents / Chemistries:

Description	Part Number
COD Reagent, LMR	25 Pack 99562-07
DI Water	2 ML EW-88401-21

Sampling

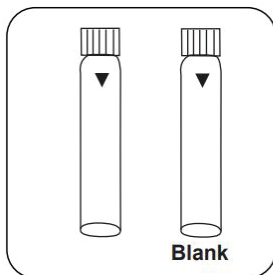
1. In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. See "Sample Preparation" Section for notes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

Notes About Method

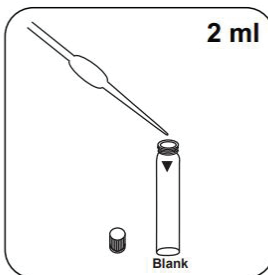
1. The blank is stable when stored in the dark.
2. Blanks and test vials must be from the same batch.
3. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Measuring

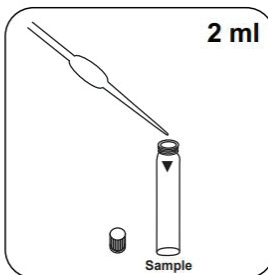
1. Select the method on the device: LMR



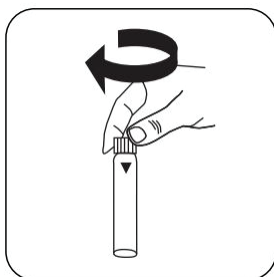
Prepare two reaction vials.
Mark one as a blank.



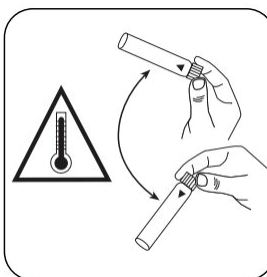
Put **2 ml deionised water**
in the blank



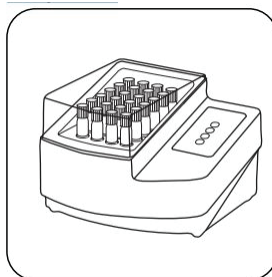
Put **2 ml sample** in the
sample vial.



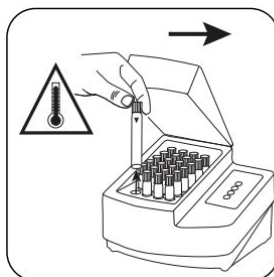
Close vials.



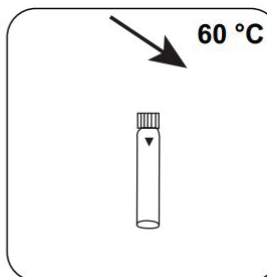
Carefully invert several
times to mix the contents.
Note: Will get hot!



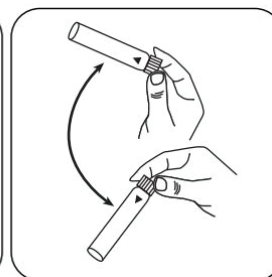
Seal the vials in the pre-
heated thermoreactor for
120 minutes at 150°C



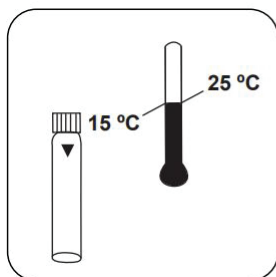
Remove the vial from the
thermoreactor. (**Note: vial
will be hot!**)



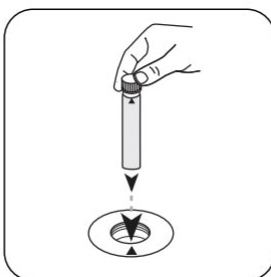
Allow vial(s) to cool to 60
°C.



Invert several times to mix
the contents.



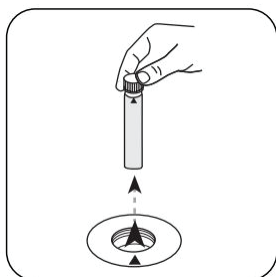
Allow the vial to cool to room temperature and then measure.



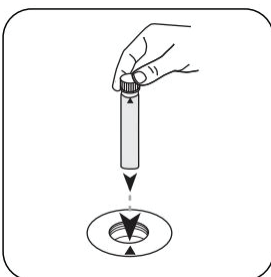
Place blank in the sample chamber. • Pay attention to the positioning.

Zero

Press the **ZERO** button



Remove vial from the sample chamber.



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

Test

Press the **TEST** button

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

COD MR**20 - 1500 mg/L COD****MR****Dichromate / H₂SO₄****Method information**

Instrument Name	Cuvette	Wavelength	Measuring Range
COD 200 Colorimeter	ø 16 mm - prefilled vial	610 nm	20 - 1500 mg/l COD

Required Materials

Description	Part Number
COD 200 Colorimeter	99561-84
Environmental Express® HotBlock COD Reactor, 115 VAC	EW-35200-99
Environmental Express® HotBlock COD Reactor, 240 VAC	EW-35201-99
Disposable Syringe, Non-Sterile, Slip-Tip, 3 mL, 100/Pk	EW-07944-04
16 MM Tube Adapter	99562-13

Required Reagents / Chemistries:

Description	Part Number
COD Reagent, MR	25 Pack 99562-09
DI Water	2 ML EW-88401-21

Sampling

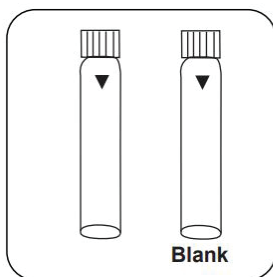
1. In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. See "Sample Preparation" Section for notes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

Notes About Method

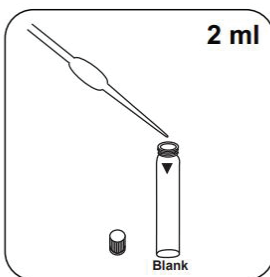
1. The blank is stable when stored in the dark.
2. Blanks and test vials must be from the same batch.
3. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Measuring

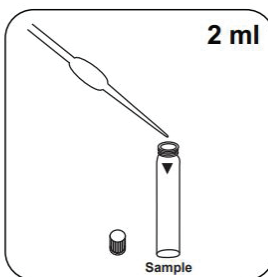
1. Select the method on the device: MR



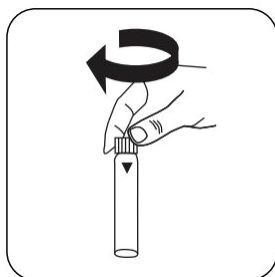
Prepare two reaction vials.
Mark one as a blank.



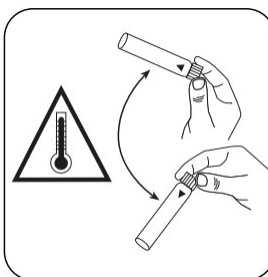
Put **2 ml deionised water**
in the blank



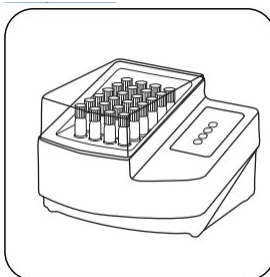
Put **2 ml sample** in the
sample vial.



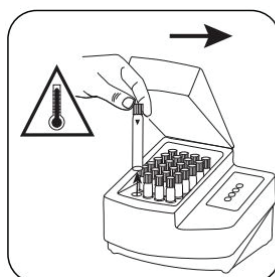
Close vials.



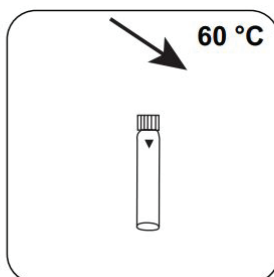
Carefully invert several
times to mix the contents.
Note: Will get hot!



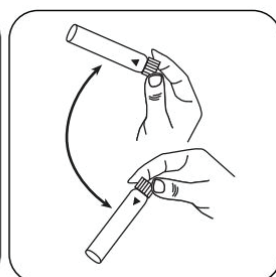
Seal the vials in the pre-
heated thermoreactor for
120 minutes at 150°C



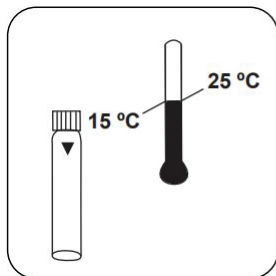
Remove the vial from the
thermoreactor. **(Note: vial
will be hot!)**



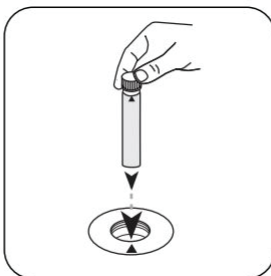
Allow vial(s) to cool to 60
°C.



Invert several times to mix
the contents.



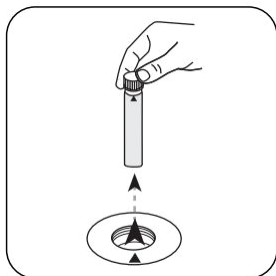
Allow the vial to cool to room temperature and then measure.



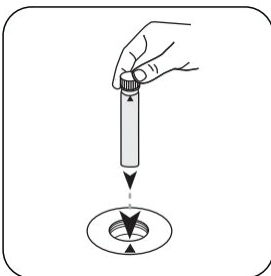
Place blank in the sample chamber. • Pay attention to the positioning.

Zero

Press the **ZERO** button



Remove vial from the sample chamber.



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

Test

Press the **TEST** button

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

COD HR**200 - 15000 mg/L COD****HR****Dichromate / H₂SO₄****Method information**

Instrument Name	Cuvette	Wavelength	Measuring Range
COD 200 Colorimeter	ø 16 mm - prefilled vial	610 nm	200 - 15000 mg/l COD

Required Materials

Description	Part Number
COD 200 Colorimeter	99561-84
Environmental Express® HotBlock COD Reactor, 115 VAC	EW-35200-99
Environmental Express® HotBlock COD Reactor, 240 VAC	EW-35201-99
Disposable Syringe, Non-Sterile, Slip-Tip, 1 mL, 100/Pk	EW-07944-00
16 MM Tube Adapter	99562-13

Required Reagents / Chemistries:

Description	Part Number
COD Reagent, HR	25 Pack 99562-11
DI Water	0.2 ML EW-88401-21

Sampling

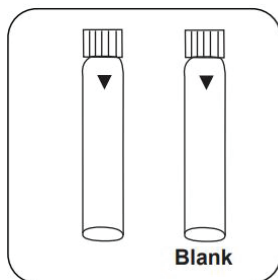
1. In the standard version, chloride interferes from a concentration of 1000 mg/L. In the mercury-free version, the disturbance depends on the chloride concentration and the COD. Concentrations from 100 mg/L chloride can lead to significant disturbances here. See "Sample Preparation" Section for notes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

Notes About Method

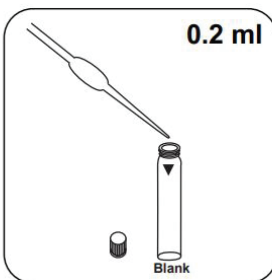
1. The blank is stable when stored in the dark.
2. Blanks and test vials must be from the same batch.
3. Do not place hot vials in the sample chamber. The most stable measured values can be determined if the vials are left standing overnight.

Measuring

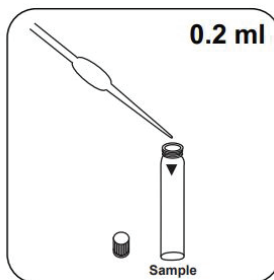
1. Select the method on the device: HR



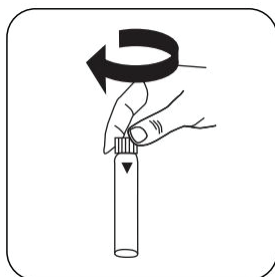
Prepare two reaction vials.
Mark one as a blank.



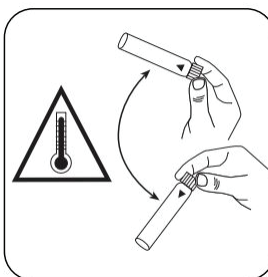
Put **0.2 ml deionised water**
in the blank



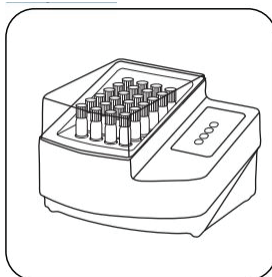
Put **0.2 ml sample** in the
sample vial.



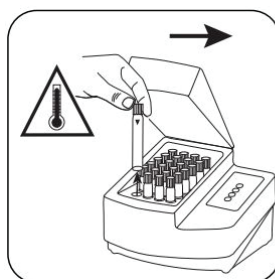
Close vials.



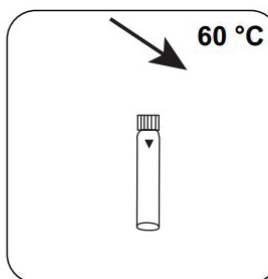
Carefully invert several
times to mix the contents.
Note: Will get hot!



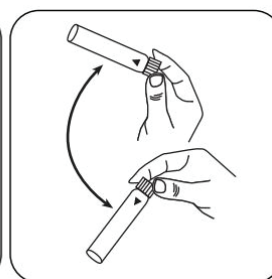
Seal the vials in the pre-
heated thermoreactor for
120 minutes at 150°C



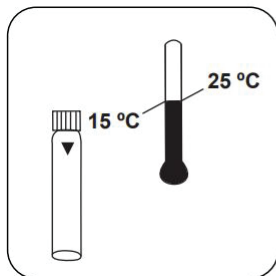
Remove the vial from the
thermoreactor. (**Note: vial
will be hot!**)



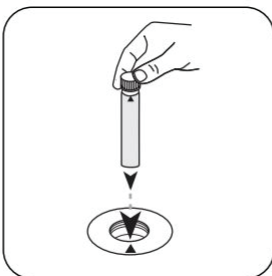
Allow vial(s) to cool to 60
°C.



Invert several times to mix
the contents.



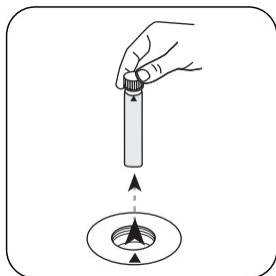
Allow the vial to cool to room temperature and then measure.



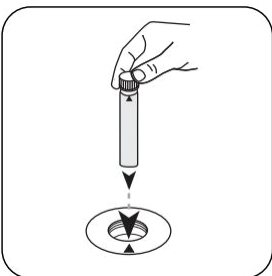
Place blank in the sample chamber. • Pay attention to the positioning.

Zero

Press the **ZERO** button



Remove vial from the sample chamber.



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

Test

Press the **TEST** button

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

Display of current calibration setting

Retrieve menu (see "Retrieve menu")



CAL

METHOD

3x = arrow symbols on Cal or Cal on the display

confirm

Display alternates between: CAL/„Methode“.

Note:

User calibration

Factory calibration



4 User calibration

Retrieve menu (see "Retrieve menu")

3x = arrow symbols on Cal or Cal on the display

confirm

Display alternates between: CAL/„Methode“.



CAL

METHOD

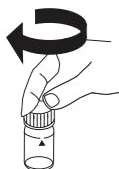


selecting a method



Fill 24 mm vial with 10 ml sample.

The sample should consist of colourless and unclouded water (e.g. deionised water, pure drinking water).



close vial



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

press

METHOD

flashes for approx. 8 seconds

0.0.0

CAL

The display shows the following in alternating mode:

Zero
Test

Perform the measurement with a known standard concentration.

press

METHOD

flashes for approx. 3 seconds

RESULT

The result is shown in the display, alternating with CAL.

CAL

If the result matches the value of the standard used (within the relevant tolerance), exit calibration mode.

On
Off

press

If the result is outside of the value (taking into account the tolerance), change the displayed value:

Mode

Press 1 x increases the displayed value by 1 digit.

Zero
Test

Press 1 x decreases the displayed value by 1 digit.

Press the corresponding key until the reading equals the value of the calibration standard.

CAL

The result is shown in the display, alternating with CAL.

RESULT + x

On
Off

press for more than 4 seconds

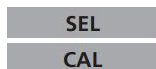
The user calibration is calculated and stored.

Factory calibration reset

Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by an arrow while the test result is displayed.

In order to reset the device to the factory calibration, proceed as follows:



press and **and hold both**

press briefly, release

release approx. 1 second.

The following messages will appear in turn on the display:

Factory calibration

oder:

User calibration

Calibration is reset to the factory setting by pressing the [MODE] key.

The following messages will appear in turn on the display:

Switch the unit off.



Environmental Express
www.environmentalexpress.com