

**REF** A11A01645

**REAGENT** 2 x 20 mL

**IVD** 



**HORIBA ABX SAS**  
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# ABX Pentra CO<sub>2</sub> RTU

■ Pentra C200

**Diagnostic reagent for quantitative *in vitro* determination of Bicarbonate / Total CO<sub>2</sub> in serum or plasma by colorimetry.**

## Application Release

**Serum, plasma: CO<sub>2</sub>**

01.xx

## Intended Use

**ABX Pentra CO<sub>2</sub> RTU** reagent is intended for the quantitative *in vitro* diagnostic determination of carbon dioxide in human serum and plasma based on an enzymatic test using phosphoenolpyruvate (PEP), phosphoenolpyruvate carboxylase (PEPC) and an analog of NADH. Bicarbonate/carbon measurements are used in the diagnosis and treatment of numerous potentially serious disorders associated with changes in body acid-base balance.

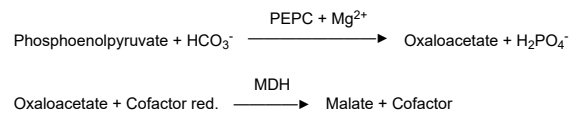
## Clinical Interest (1)

Plasmatic bicarbonates are one of the principle buffer of the organism. Their measurement is used in the diagnosis of the acid-base-balance in the blood. This balance is based on the Henderson-Hasselbach equation ( $pH = pK + \log\left(\frac{[\text{bicarbonates}]}{pCO_2}\right)$ ) which implies that all compensation mechanisms are intended for maintaining the relation  $\left(\frac{[\text{bicarbonates}]}{pCO_2}\right)$  constant.

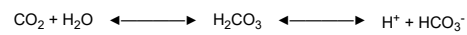
Elevated and decreased values indicate disorders associated with disturbances of the metabolic and respiratory systems.

## Method (2)

Enzymatic test using phosphoenolpyruvate carboxylase (PEPC) and a stable NADH analog.



The reaction disturbs following equilibrium:



(PEPC = Phosphoenolpyruvate carboxylase, MDH = Malate Dehydrogenase)

This results in a conversion of CO<sub>2</sub> to bicarbonate (HCO<sub>3</sub><sup>-</sup>) which then is included in the reaction. Therefore the total CO<sub>2</sub> concentration is measured.

The decrease of reduced cofactor concentration is measured at 405 nm and is proportional to the concentration of total carbon dioxide in the sample.

## Reagents

**ABX Pentra CO<sub>2</sub> RTU** is ready-to-use.

### Reagent:

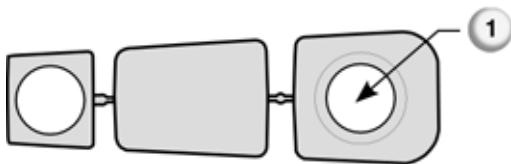
Buffer pH 7.5	
Phosphoenolpyruvate (PEP)	12.5 mmol/L
Phosphoenolpyruvate carboxylase (PEPC)	> 400 U/L
Malate dehydrogenase (MDH)	> 4100 U/L
NADH analog	0.6 mmol/L
Activators, stabilizers, surfactant, preservative	

**ABX Pentra CO<sub>2</sub> RTU** should be used according to this notice. The manufacturer cannot guarantee its performance if used otherwise.

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## Handling

1. Identify the cassette by using dedicated reagent stickers with barcode (602).
2. Transfer the reagent into compartment 1 (30 ml capacity) of the cassette 30/10 provided (see diagram below).  
The compartment 2 of the cassette will be unused.



3. If present, remove foam by using a plastic pipette.
4. Recap the original vial of remaining reagent and store it at 2-8°C.
5. Place the reagent cassette at an available position on the reagent tray in the refrigerated Pentra C200.

## Calibrator

For calibration, use:

**ABX Pentra CO<sub>2</sub> Cal** (A11A01648) (not included)  
3 x 3 mL

## Control

For internal quality control, use:

■ **ABX Pentra CO<sub>2</sub> Control** (A11A01650) (not included)  
3 x 3 mL

Each control should be assayed daily and/or after a calibration.

The frequency of controls and the confidence intervals should correspond to laboratory guidelines and country-specific directives. You should follow federal, state and local guidelines for testing quality control materials. The results must be within the range of the defined confidence limits. Each laboratory should establish a procedure to follow if the results exceed these confidence limits.

## Materials Required but not Provided

■ Automated clinical chemistry analyzer: Pentra C200

- Calibrator: **ABX Pentra CO<sub>2</sub> Cal** (A11A01648)
- Control: **ABX Pentra CO<sub>2</sub> Control** (A11A01650)
- Standard laboratory equipment.

## Specimen <sup>a</sup>

This device intended testing population is general population.

- Serum.
- Plasma in lithium heparin.

Anticoagulants other than those listed have not been tested by HORIBA Medical and are therefore not recommended for use with this assay.

## Stability (3, 4):

- At 20 - 25°C: 1 day
- At 4 - 8°C: 7 days
- At -20°C: 2 weeks

1. Serum or plasma should be separated from cells immediately and stored at 2-8°C.
2. Exposure of samples to air should be minimized.
3. Samples should be stored tightly sealed to prevent loss of carbon dioxide and assayed as soon as possible after collection.
4. Do not use icteric samples.

## Reference Range (1) <sup>b</sup>

Each laboratory should establish its own reference ranges. The values given here are used as guidelines only.

Adults: 22 - 29 mmol/L.

Clinical sensitivity and specificity, positive predictive value and negative predictive value are not commonly reported for this analyte. This is largely attributed to the fact that this analyte is not sole indicator for the intended purpose and patient treatment decision making. To arrive at a diagnosis and a course of treatment, results from others routine clinical chemistry tests should be used in conjunction with other diagnostic information and the attending health-care professional's evaluation of the patient's condition.

<sup>a</sup>Modification: modification of "Specimen".

<sup>b</sup>Modification: information added.

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## Storage and Stability

### Stability before opening:

Stable up to the expiry date on the label if stored at 2-8°C. Store protected from light.

### Stability after opening:

Refer to the paragraph "Performance on Pentra C200".

Do not freeze.

## Waste Management

Please refer to local legal requirements.

- Please refer to local legal requirements.
- This reagent contains less than 0.1% of sodium azide as a preservative. Sodium azide may react with lead and copper to form explosive metal azides.

## General Precautions <sup>c</sup>

- This reagent is for professional *in vitro* diagnostic use only.  
For laboratory use.
- For prescription use only.
- This reagent is classified as non-hazardous in compliance with regulation (EC) N°.1272/2008.
- **Warning:** This reagent is obtained from substances of animal origin. Consequently, it should be treated as potentially infectious and handled with the appropriate cautions in accordance with good laboratory practices (5).
- Do not pipette by mouth.
- Do not replenish the reagents.
- Do not swallow. Avoid contact with skin and mucous membranes.
- Observe the standard laboratory precautions for use.
- The reagent vials are disposable and should be disposed of in accordance with the local legal requirements.
- Please refer to the SDS associated with the reagent.
- Do not use the product if there is visible evidence of biological, chemical or physical deterioration.
- Do not use the product if the recommended storage conditions, including temperature, are not followed.
- User must be trained by a HORIBA Medical representative before attempting to operate the device.

- It is the user's responsibility to verify that this document is applicable to the reagent used.
- For technical assistance, you can call +33 (0)4 67 14 15 16.
- Any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the country in which the user and/or the patient is established.

## Performance on Pentra C200

### Lot to Lot Variability <sup>d</sup>

The recovery of samples (serum and plasma) done during QC release of three consecutive lots of reagent shows that the lot to lot variability is within specification: < 10%.

### Serum, plasma

The performance data listed below have been obtained on the Pentra C200 analyzer.

**Number of tests:** approximately 2 x 85 tests

### On Board Reagent Stability

The reagent cassette placed in the refrigerated Pentra C200 compartment is stable for 19 days.

**Sample volume:** 2.8 µL/test

### Detection Limit <sup>e</sup>

The detection limit is determined according to CLSI (NCCLS), EP17-A protocol (6) and equals 2.18 mmol/L.

### Limit of Quantitation <sup>f</sup>

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A protocol (6) and equals 4.0 mmol/L.

## Accuracy and Precision

### Repeatability (*within-run precision*)

Repeatability according to the recommendations found in the Valtec protocol (7) with samples tested 20 times:

- 1 control
- 3 specimens (low / medium / high levels)

<sup>c</sup>Modification: general precautions modification.

<sup>d</sup>Modification: chapter added.

<sup>e</sup>Modification: modification of detection limit.

<sup>f</sup>Modification: modification of quantitation limit.

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	Mean value mmol/L	CV %
Control specimen	20.23	0.52
Specimen 1	9.76	2.63
Specimen 2	20.34	0.65
Specimen 3	25.77	1.14

## Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP5-A2 protocol (8) with samples tested in duplicate for 20 days (2 series per day):

- 1 control
- 3 specimens (low / medium / high levels)

	Mean value mmol/L	CV %
Control specimen	21.27	5.9
Specimen 1	9.90	6.2
Specimen 2	19.69	4.7
Specimen 3	29.93	5.3

## Measuring Range <sup>g</sup>

The assay confirmed a measuring range from 4.0 mmol/L to 60 mmol/L.

The measuring range is extended up to 180 mmol/L with the automatic post-dilution.

The reagent linearity has been assessed up to 60 mmol/L according to the recommendations found in the CLSI (NCCLS), EP06-Ed2 protocol (9).

## Correlation <sup>h</sup>

Patient samples: Serum and plasma

Number of patient samples: 101

Specimens are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP09c protocol (10).

Values ranged from 4.46 mmol/L to 56.24 mmol/L.

The equation for the allometric line obtained using Passing-Bablok regression procedure (11) is:

$$Y = 1.007 X - 0.6561 \text{ (mmol/L)}$$

with a correlation coefficient  $r^2 = 0.963$ .

## Interferences

Haemoglobin: No significant influence is observed up to 200 µmol/L (345 mg/dL).

Triglycerides: No significant influence is observed up to a triglyceride concentration of 6.17 mmol/L (539.88 mg/dL).

Total Bilirubin: No significant influence is observed up to 125 µmol/L (7.3 mg/dL).

Direct Bilirubin: No significant influence is observed up to 500 µmol/L (29.3 mg/dL).

*Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (12, 13).*

## Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 1 control specimen.

The calibration stability is 19 days.

*Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.*

## Reference

1. Müller-Plathe O. Acid base balance and blood gases. In: Thomas L., editor. Clinical laboratory diagnostics. 1<sup>st</sup> ed. Frankfurt: T.H. Books Verlagsgesellschaft (1998): 318-329.
2. Norris KA, Atkinson AR, Smith WG. Colorimetric Enzymatic Determination of Serum Total Carbon Dioxide as Applied to the Vickers Multichannel 300 Discrete Analyzer. Clin. Chem. (1975) **21**: 1093-1101.
3. Tietz. Textbook of Clinical Chemistry and Molecular Diagnostics. 4<sup>th</sup> Edition (Elsevier Saunders eds. St Louis USA), (2006): 990-991.
4. Guder WG, Zawta B et al. The Quality of Diagnostic Samples. 1<sup>st</sup> ed. Darmstadt: GIT Verlag, (2001): 18-19.
5. Council Directive (2000/54/EC). Official Journal of the European Communities. No. L262 from October 17, 2000: 21-45.
6. Protocols for determination of limits of detection and limits of quantitation. Approved Guideline, CLSI (NCCLS) document EP17-A (2004) **24** (34).
7. Vassault A, Grafmeyer D, Naudin C et al. Protocoles de validation de techniques (document B). Ann. Biol. Clin. (1986) **44**: 686-745.
8. Evaluation of Precision Performance of Quantitative Measurement Method. Approved Guideline, CLSI (NCCLS) document EP5-A2 (2004) **24** (25).
9. Evaluation of Linearity of Quantitative Measurement Procedures. 2<sup>nd</sup> Edition, CLSI (NCCLS) guideline EP06-Ed2 (2020) **40** (16).

<sup>g</sup>Modification: modification of measuring range.

<sup>h</sup>Modification: modification of correlation.

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10. Measurement Procedure Comparison and Bias Estimation Using Patient Samples. Approved Guideline, 3<sup>rd</sup> ed., CLSI (NCCLS) document EP09c (2018) **38** (12).
11. Passing H, Bablok W. A new biometrical procedure for testing the equality of measurements from two different analytical methods. J. Clin. Chem. Clin. Biochem. (1983) **21**: 709-720.
12. Young DS. Effects of Drugs on Clinical Laboratory Tests. 4<sup>th</sup> Edition, Washington, DC, AACC Press (1997) **3**: 143-163.
13. Young DS. Effects of Preanalytical Variables on Clinical Laboratory Tests. 2<sup>nd</sup> Edition, Washington, DC, AACC Press (1997) **3**: 120-132.

