

Liquid Regents – ready to use

CARBON DIOXIDE (CO₂, BICARBONATE) PEP-C

Single Reagent

Diagnostic reagent for quantitative in vitro determination of bicarbonate (CO₂) in human serum or plasma on photometric systems

Ref.No.	Kit Size	Configuration
N00045B	1 x 10 L	Single Reagent
N03122B	1 x 1 L	Single Reagent
N00043/20	5 x 50 ml	Single Reagent
N88911	5 x 50 ml	Single Reagent
N0414917	9 x 65 ml	Single Reagent
NA0820	5 x 20 ml	Single Reagent
NT1020	5 x 20 ml	Single Reagent
NK0712	5 x 50 ml	Single Reagent
NB0920	2 x 100 ml	Single Reagent

Additionally offered:

D06520SV	1 x 3 mL	CO ₂ Standard
D16525	3 x 3 mL	CO ₂ Control
D16525SV	1 x 3 mL	CO ₂ Control

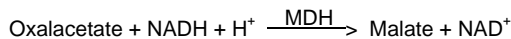
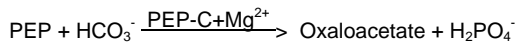
TEST PARAMETERS

Method:	Colorimetric, endpoint, decreasing reaction, enzymatic, PEP-C
Wavelength:	405 nm, 415 nm
Temperature:	37 °C
Sample:	Serum or heparin plasma,
Linearity:	up to 50 mmol/L
Sensitivity:	The lower limit of detection is 1 mmol/L

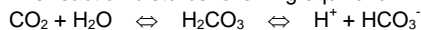
SUMMARY [1]

Measurement of bicarbonate is used in the diagnosis of the acid-base-balance in the blood. Elevated and decreased values indicate disorders associated with disturbances of the metabolic and respiratory systems.

TEST PRINCIPLE



The reaction disturbs following equilibrium:



This results in conversion of the CO₂ to bicarbonate HCO₃⁻ which then is included in the reaction. Therefore, the total CO₂ concentration is measured.

The decrease in absorbance resulting from the oxidation of NADH to NAD⁺ is measured at 405 or 415 nm and is proportional to the concentration of total carbon dioxide (CO₂) in the sample.

REAGENT COMPOSITION

COMPONENTS	CONCENTRATION
Buffer, pH 7.5	
Phosphoenolpyruvate (PEP)	12.5 mmol/L
Phosphoenolpyruvate carboxylase (PEP-C)	> 400 U/L
Malate dehydrogenase (MDH)	> 4100 U/L
NADH analog	0.6 mmol/L

REAGENT PREPARATION

The reagent is ready to use.

REAGENT STABILITY AND STORAGE

Conditions:	Protect from light. Close immediately after use Avoid contamination. Do not freeze the reagent.
Storage:	at 2 – 8 °C
Stability:	up to the expiration date indicated on labels

SAMPLE STABILITY AND STORAGE

Serum or plasma should be separated from cells immediately and stored at 2 – 8 °C. Exposure of samples to air should be avoided. Samples should be stored tightly sealed to prevent loss of carbon dioxide and assayed as soon as possible after collection.

Stability [4]:	at 20 – 25 °C	1 day
	at 4 - 8 °C	7 days
	at -20 °C	2 weeks

Freeze only once!

Discard contaminated specimens.

MATERIALS REQUIRED BUT NOT PROVIDED

NaCl solution 9 g/L
General laboratory equipment

STANDARD

(not included in the kit – has to be ordered separately)

Concentration	30 mmol/L
Storage:	2 – 25 °C
Stability:	In original container up to the expiration date Once opened, the standard is stable for 3 months, if recapped immediately after use.

CLOSE IMMEDIATELY AFTER USE!

Protect from light.

Always use fresh aliquots for calibration!

MANUAL TEST PROCEDURE

Pipette into test tubes	Blank	Standard	Sample
Reagent	1000 µL	1000 µL	1000 µL
Sample	-	-	10 µL
Standard	-	10 µL	-
Distilled water	10 µL	-	-

Mix, incubate at 37 °C and read absorbance A1 after exactly 2 minutes against reagent blank. Incubate for exactly further 8 min. at 37 °C and read absorbance A2 against reagent blank. Calculate: $\Delta A = (A2 - A1)$ sample or standard

CALCULATION

$$\text{CO}_2 \text{ [mmol/L]} = \frac{\Delta A \text{ Sample}}{\Delta A \text{ Standard}} \times \text{Conc. of Std [mmol/L]}$$

UNIT CONVERSION

$$\text{mmol/L} = \text{mEq/L}$$

REFERENCE RANGES [1] *

Adults: 22 – 29 mmol/L (mEq/L)

* Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

PERFORMANCE CHARACTERISTICS

LINEARITY, MEASURING RANGE

The test has been developed to determine CO₂ concentrations within a measuring range from 4 to 50 mmol/L. Samples with CO₂ concentrations higher than 50 mmol/L should be diluted 1+1 with NaCl solution (9 g/L) and the results multiplied by 2.

PRECISION

Intra-assay n = 20	Mean [mmol/L]	SD [mmol/L]	CV [%]
Sample 1	17.6	0.14	0.80
Sample 2	19.9	0.16	0.80
Sample 3	30.1	0.28	0.93

Inter-assay n = 20	Mean [mmol/L]	SD [mmol/L]	CV [%]
Sample 1	16.8	0.53	3.16
Sample 2	20.3	0.49	2.40
Sample 3	30.0	0.68	2.26

SENSITIVITY/LIMIT OF DETECTION

The lower limit of detection is 1 mmol/L

INTERFERING SUBSTANCES

no interference up to:

Ascorbic acid	30 mg/dl
Bilirubin, conjugated	50 mg/dl
Bilirubin, free	40 mg/dl
Hemoglobin	500 mg/dl
Triglycerides	1400 mg/dl

For further information on interfering substances refer to Young DS [5].

METHOD COMPARISON

A comparison of Dialab Carbon Dioxide (y) with a commercially available assay (x) using 107 samples gave following results:

$$y = 0.989 x + 0.354 \text{ mmol/L}; r = 0.998$$

CALIBRATION

The assay requires the use of a carbon dioxide standard or calibrator.

We recommend the Dialab **CO₂ Standard**.

This method has been standardized against a primary standard on basis of sodium carbonate.

QUALITY CONTROL

All controls with carbon dioxide values determined by this method can be used.

We recommend the Dialab **CO₂ Control**.

Each laboratory should establish corrective action in case of deviations in control recovery.

AUTOMATION

Special applications for automated analysers can be made on request.

WASTE MANAGEMENT

Please refer to local legal requirements.

WARNINGS AND PRECAUTIONS

1. Reagent contains biological material. Handle the product as potentially infectious according to universal precautions and good clinical laboratory practices.
2. In very rare cases, samples of patients with gammopathy might give falsified results [6].
3. Please refer to the safety data sheet and take the necessary precautions for the use of laboratory reagents.
4. For diagnostic purposes, the results should always be assessed with the patient's medical history, clinical examinations and other findings.
5. For professional use only!

REFERENCES

1. Müller-Plathe O. Acid base balance and blood gases. In: Thomas L. Clinical Laboratory Diagnostics. 1st ed. Frankfurt: TH-Books Verlagsgesellschaft; 1998. P. 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 analyser. Clin Chem 1975; 21: 1093-1101.
3. US patent #5,801,006
4. Guder WG, Zawta B et al. The Quality of Diagnostic Samples. 1st ed. Darmstadt: GIT Verlag; 2001; p.18-9.
5. Young DS. Effects of Drugs on Clinical Laboratory Tests. 5th ed. Volume 1 and 2. Washington, DC: The American Association for Clinical Chemistry Press 2000.
6. Bakker AJ, Mücke M Gammopathy interference in clinical chemistry assays: mechanisms, detection and prevention. ClinChemLabMed 2007; 45(9): 1240-1243.

