

# Carbon Dioxide (CO<sub>2</sub>) Reagent

Catalog #: 43706

for use with the

## SDI CA480 Clinical Chemistry System

### INTENDED USE

For the *in vitro* quantitative determination of Carbon Dioxide in serum.

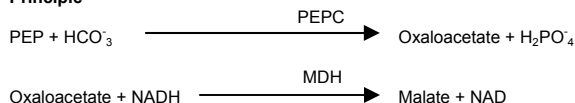
### SUMMARY AND EXPLANATION<sup>1</sup>

Approximately ninety percent of Carbon Dioxide present in serum is in the form of bicarbonate. The measurement of bicarbonate, usually in conjunction with tests such as glucose, urea, sodium, potassium, and chloride is useful in the assessment of acid-base balance resulting from metabolic or respiratory causes.

### METHODOLOGY<sup>2,3</sup>

The SDI Carbon Dioxide procedure is based upon phosphoenolpyruvate carboxylase (PEPC) utilizing bicarbonate present in the sample to produce oxaloacetate and phosphate. Malate dehydrogenase (MDH) then catalyzes the reduction of oxaloacetate to malate and the oxidation of NADH to NAD. The resulting decrease in absorbance can be measured at 380nm and is proportional to the amount of bicarbonate in the sample.

### Principle



### REAGENT COMPOSITION

Active Ingredients	Concentration
Phosphoenolpyruvate	8.0 mM
NADH	1.4 mM
Phosphoenolpyruvate carboxylase (microbial)	>400 U/L
MDH (microbial)	>200 U/L
PH 7.9	

### Precautions

1. Reagent contains Sodium Azide. This may react with copper or lead plumbing to form explosive metal azides. Upon disposal, flush with a large volume of water to prevent azide build up.
2. Reagents are for *in vitro* diagnostic use only.
3. Do not ingest. Toxicity has not been established.
4. Do not pipet by mouth to avoid CO<sub>2</sub> contamination from the expired air.

### REAGENT PREPARATION

Reagent is supplied ready to use.

### REAGENT STORAGE

1. Store the reagent at 2-8°C (refrigerated)
2. The reagent is stable until the expiration date when stored at 2-8°C

### REAGENT DETERIORATION

Do not use the reagent if:

1. The absorbance of the reagent is less than 0.85 at 380nm
2. Working reagent does not meet stated performance parameters

### SPECIMEN COLLECTION AND STORAGE

1. Fresh, unhemolyzed serum, collected under anaerobic conditions is the recommended specimen
2. The specimen stored tightly stoppered is stable for several days at 4°C.<sup>4</sup>

### INTERFERENCES

Studies to determine the level of interference for hemoglobin, bilirubin, and lipemia were carried out, the following results were obtained:

#### Hemoglobin:

No significant interference (± 10%) from hemoglobin up to 1000 mg/dL

#### Bilirubin:

No significant interference (± 10%) from bilirubin up to 13.1 mg/dL

#### Lipemia:

No significant interference (± 10%) from lipemia up to 1086 mg/dL measured as triglycerides

A number of drugs and substances may affect the accuracy of this test. See Young, et al<sup>5</sup>

### ADDITIONAL EQUIPMENT REQUIRED BUT NOT PROVIDED

1. SDI CA480 Clinical Chemistry System
2. Deionized water and related equipment, e.g.: pipettes
3. Analyzer specific consumables, e.g.: sample cups
4. Control, and Calibrator materials such as those provided by SDI Biomed

### ASSAY PROCEDURE

System Parameters	
Carbon Dioxide (CO <sub>2</sub> ) Liquid	
TEMPERATURE:	37°C
WAVELENGTH:	380 nm
DIRECTION:	Decrease
SAMPLE / RGT RATIO:	1 : 100
e.g. Sample Vol.	0.01 mL (10mL)
Reagent Vol.	1.00 mL
REACTION TIME:	5 min

### Procedure Notes:

1. The reagent and sample volumes may be altered proportionally to accommodate various instrument requirements.

### Calculations:

(A = Absorbance)

$$\frac{A(\text{Reagent Blank}) - A(\text{Sample})}{A(\text{Reagent Blank}) - A(\text{Standard})} \times \text{Concentration of Standard} = \text{CO}_2 \text{ (mEq/L)}$$

Example:	
A (Reagent Blank)	= 1.500
A (Standard)	= 1.200
A (Sample)	= 1.240
Concentration of Standard	= 30 mEq/L

$$\frac{1.500 - 1.240}{1.500 - 1.200} \times 30 \text{ mEq/L} = \frac{.260}{.300} \times 30 \text{ mEq/L} = 26 \text{ mEq/L CO}_2$$

### Limitations

1. Samples exceeding 50 mEq/L must be diluted 1:1 with saline, re-assayed, and the result multiplied by two
2. Carbon Dioxide contamination must be avoided

### CALIBRATION

Use an aqueous CO<sub>2</sub> standard or an appropriate serum calibrator. Refer to appropriate instrument operator manual for recommended calibrator interval.

### QUALITY CONTROL

The integrity of the reagent should be monitored by use of a two level control with known CO<sub>2</sub> values.

### EXPECTED VALUES<sup>6</sup>

23 – 29 mEq/L

It is strongly recommended that each laboratory determine its own reference range

### PERFORMANCE

#### Linearity:

When run as recommended the assay is linear to 50 mEq/L

### Method Comparison:

Studies performed between this procedure and a similar methodology yielded the following results:

Number of samples pairs:	42
Range of samples:	6 – 45 (mEq/L)
Correlation Coefficient:	0.9832
Slope:	0.964
Intercept:	0.6 (mEq/L)

### Precision:

	Level 1	Level 2	Level 3
Within Run n=40			
Mean (mEq/L)	16.5	25.4	44.5
S.D. (mEq/L)	0.4	0.5	0.4
C.V. (%)	2.5	2.2	0.9

### Total

n=40 (10 days / 2 runs per day / 2 replicates per run)

Mean (mEq/L)	16.5	25.4	44.5
S.D. (mEq/L)	0.5	0.8	0.8
C.V. (%)	3.1	3.1	1.9

### Sensitivity:

A calibration factor of approximately 33 was obtained, which is equivalent to a sensitivity of 0.03 D Abs per mg/dL

### REFERENCES

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4. Kaplan, L.A., Clinical Chemistry: Theory, Analysis and correlation, C.V.Mosby, St Louis, p872 (1989)
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Rev. 09/05/06