ENVOY® 500 CALCIUM REAGENT KIT

APPLICATION PARAMETERS

PRIMARY PARAMETERS

Code	CA
Bar-Code	Active
Code for Bar-Code	343
Test Methodology	Arsenazo III
Method	End Point
Kind of Process	Linear
1st Filter	630
2nd Filter	700
Reaction direction	Increasing

REAGENTS

Number of reagents	1
Reagent 1 Volume µL	294
Concentrated	Inactive
Reagent 2 Volume µL	N/A
Concentrated	Inactive

SAMPLE	Serum	Urine
Name	CAL	CAL
Sample µL	6	6
Pre-Dilution 1:	1	1
Post-Dilution 1:	1	5

TIMES

Sample Starter	Inactive
Delay Time	0
Reading Time	40
Reagent 1 Incubation Time	20
Reagent 2 Incubation Time	N/A

CHECK PARAMETERS

Reagent Limit (mABS)	1500
Curve Acceptance (%)	100

RE-RUN SERUM

Test Limit (Conc)	15
☛Low Test Limit (Conc)	0,36
Initial ABS (mABS)	N/A
Final ABS (mABS)	N/A
Max ABS Delta (mABS)	9999
Prozone Check	Inactive

Normal Range	Min	Max
Man	[User defined]	
Woman	[User defined]	
Child	[User defined]	

Re-run hyperactive	Inactive
Re-run pathological	Inactive

RE-RUN URINE

Test Limit (Conc)	18
☛Low Test Limit (Conc)	0.22
Initial ABS (mABS)	N/A
Final ABS (mABS)	NA
☛Max ABS Delta (mABS)	9999
Prozone Check	Inactive

Normal Range	Min	Max
Man		[User defined]
Woman		[User defined]
Child		[User defined]

☛ Re-run hyperactive	Active
Re-run pathological	Inactive

SECONDARY PARAMETERS

	Serum	Urine
1st Unit	mg/dL	☛ mg/dL
2nd Unit	Inactive	Inactive
Dynamic Blank	Inactive	
Needle washes	[From Settings Table]	
Cuvette washes	[From Settings Table]	
	Serum	Urine
Instrumental Factor	1.000	1.000
Shift	0.000	0.000
Reagent Blank	Every Day	
Decimals	2	

STANDARD PARAMETERS

Factor	[Determined by calibration]
Minimum	10
Maximum	17
Number of Samples	1
Max Var. (%)	10
Timed re-run	Inactive
N. replicates	3
Reagents ABS	[Determined by Envoy]
Pos.	[From Settings Table]
Conc.	[From calibrator labeling]
ABS	[Determined by Envoy]
% from last calibration	100

PROGRAMMING INSTRUCTIONS

Detailed instructions for programming reagent parameters are provided in the Envoy 500 Operator Manual and Envoy500 Settings Table.

If the Envoy 500 Chemistry System is not pre-programmed, a calcium code must first be added before the parameters can be entered. On the menu bar, select «Test → Test Directory.» A new window will open up listing all the codes for the tests that are installed on the instrument. Click on the «New Code» button, type «CA» into the Code field and select «Save.»

To program the application parameters, check the box next to the code for the cacium test, and select the «Parameters» button located at the bottom of the window. To program standard information, click the «Standards» button located at the bottom of the window.

ELITech Clinical Systems SAS
Zone Industrielle
61500 SEES
France

For Technical questions, Please call or contact
(855) 354-8324 - www.elitechgroup.com
27 Wellington Road
Lincoln, Rhode Island 02865 - U.S.A.

(09/2015)
FTEVY-CALA-v3

ENVOY® 500 CALCIUM REAGENT KIT

Product no. 55287

For *in vitro* diagnostic use

☛CAUTION : Federal Law restricts this device to sale by or on the order of a licensed healthcare practitioner (Rx ONLY)

☛INTENDED USE

Envoy® 500 Calcium is intended for the quantitative *in vitro* diagnostic determination of total calcium in human serum, plasma and urine on Envoy 500 Series Analyzers. Calcium measurements are used in the diagnosis and treatment of parathyroid disease, a variety of bone diseases, chronic renal disease and tetany (intermittent muscular contractions or spasms).
It is not intended for use in Point of Care settings.

CLINICAL SIGNIFICANCE [1,3]

In blood, approximately 50 % of the calcium is free, 40% is protein bound mainly associated with albumin and 10 % is complexed. Calcemia measures total calcium but only free calcium is biologically active. Calcium plays an active physiological role in bone mineralisation, neuromuscular excitability, muscle contraction, and blood coagulation.
Protein levels must be considered for the proper interpretation of total serum calcium levels. Hypocalcemia can result from chronic renal failure, hypoparathyroidism, vitamin D deficiency (osteomalacia, rickets…)...
The most common cases of hypercalcemia are associated with hyperparathyroidism, tumours and metastases, hyperthyroidism or vitamin D overdose...

METHODOLOGY [4]

Direct colorimetric complexometric test (Arsenazo III).
End point.

Arsenazo III [2,7-(bis(2-arsonophenylazo))-1,8-dihydroxynaphtalene-3,6-disulphonic acid], forms in neutral medium a blue complex with calcium. The colour intensity is directly proportional to the total calcium concentration.

REAGENTS

COMPOSITION

Calcium Reagent R contains 100 mmol/L MES Buffer, pH 6.50 ; 200 µmol/L Arsenazo III

☛WARNINGS AND PRECAUTIONS

- This reagent is for professional *in vitro* diagnostic use only.
- Take normal precautions and adhere to good laboratory practice.
- Use clean or single use laboratory equipment only to avoid contaminations.
- Dispose of contents in accordance with all local, state and federal regulations.
- For more information, Safety Data Sheet (SDS) is available on request for professional user.

PREPARATION

Calcium Reagent is ready for use on the Envoy 500 Analyzer as packaged.

STORAGE AND STABILITY

Store this reagent at 2 to 8 °C and protected from light. Do not freeze. Unopened reagents are stable to the expiration dates on the bottle labels. The reagent is stable for 28 days onboard the Envoy 500 Analyzer.

☛SPECIMENS [1,2,5]

COLLECTION AND STORAGE

Fresh unhemolyzed serum, lithium heparinized plasma and urine collected over 24 hours are the prefered specimens. Do not analyze whole blood.
Collect specimens by venipuncture according to accepted clinical protocol. Serum must be separated from cells as quickly as possible.
After collection, urine specimens should be acidified with chlorhydric acid 6N to a pH < 2 to prevent calcium salt precipitation.
For best results, use only fresh specimens. Total calcium is stable in serum and plasma at room temperature for up to 7 days, at 2-8 °C for 3 weeks and in frozen state (-20 °C) for up to 8 months. Urine can be preserved at room temperature for up 2 hours, at 2-8 °C for 4 hours and in frozen state (-20 °C) for up 3 weeks.

PROCEDURE

☛MATERIALS PROVIDED

The Envoy 500 Calcium Reagent Kit includes the following components:

8 x 40.7 mL boats of Envoy 500 Calcium Reagent.

MATERIALS REQUIRED BUT NOT PROVIDED

- Envoy 500 Serum Calibrator (product no. 55111).
- Envoy 500 Serum Controls (product no. 55131).
- Normal saline.
- Analyzer specific consumables
- General Laboratory Equipment.

REAGENT INSTALLATION AND USE

Program the instrument using the application parameters and programming instructions provided at the end of this Instructions For Use.

Refer to the Operator Manual for additional information on installing reagents and programming the analyzer, and running samples, calibrators and controls.

The Envoy 500 Calcium Reagent is ready to use as packaged.

Do not remove the caps from the bottles until you are ready to install the reagent on the analyzer. Before installing, mix the reagents by gently inverting the reagent boats several times. Record the installation date on the label and insert the unit into the designated position on the reagent tray. Let the reagent equilibrate on the instrument for at least 30 minutes before use.

CALIBRATION

Calibrate the instrument after loading new reagent lot, after maintenance and whenever quality control results fall outside established limits. Under typical use conditions, calibration factors for this test are valid for 28 days. Refer to the Operator Manual for calibration procedures.

QUALITY CONTROL

Quality control requirements should be established in accordance with local, state and/or federal regulations or accreditation requirements.

Assay at least two levels of serum control daily. Serum Controls for Envoy 500 level 1 and level 2 may be used. Controls should also be assayed after performing a reagent blank, calibrating, maintaining the instrument and after loading a new reagent unit.

Controls may be assayed more frequently based on laboratory workflow and the discretion of the user.

CALCULATIONS

All calculations are performed by the instrument.

To calculate the result in SI units (mmol/L), multiply the result in conventional units (mg/dL) by 0.25

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LIMITATIONS

Samples must be free from haemolysis. Use only acceptable specimens as described under Collection and Storage. Do not report results outsideof the usable range shown below. Refer to the Interfering Substances section for possible sources of chemical interference.

☛PERFORMANCE CHARACTERISTICS

MEASURING RANGE

Determined according to CLSI[6] EP6-A protocol

a) Serum/Plasma

The measuring range is from 5.00 to 15.00 mg/dL (1.25 to 3.74 mmol/L).

b) Urine

The measuring range is listed below. Samples that exceed the upper limit should be diluted 1:5 with NaCl 9 g/L solution (normal saline) and re-assayed. The recovery observed did not exceed the expected recovery by >±10%.

The «Re-run hyperactive» function performs the dilution automatically. Results take the dilution into account.

Range	Conventional Units	SI Units
Default	1.50 to 18.00 mg/dL	0.37 to 4.49 mmol/L
Hyperactive	18.00 to 90.00 mg/dL	4.49 to 22.46 mmol/L

LIMIT OF DETECTION (LOD) AND LIMIT OF QUANTIFICATION (LOQ)

Determined according to CLSI[7] EP17-A protocol:

a) Serum/Plasma

LoD = 0.36 mg/dL (0.09 mmol/L)

LoQ = 5.00 mg/dL (1.25 mmol/L).

b) Urine

LoD = 0.22 mg/dL (0.05 mmol/L)

LoQ = 1.50 mg/dL (0.37 mmol/L).

EXPECTED VALUES [1,8]

Published reference ranges for calcium are listed below:

Reference Range	Conventional Units	SI Units
Serum, plasma :	8.6 - 10.3 mg/dL	2.15 - 2.57 mmol/L
Urine:	100 – 300 mg/24h*	2.50 – 7.50 mmol/24h*

Calcemia is always interpreted according to the plasmatic protein rates.

* for an urinary volume of 1.5 L per 24 hours.

Note: *The quoted range should serve as a guide only. It is recommended that each laboratory verifies this range or establishes a reference interval for the intended population.*

PRECISION

Determined according to CLSI[9] EP5-A2 protocol.

a) Serum/Plasma

Sample	n	Mean		Within-run	Total
		mg/dL	mmol/L	CV (%)	
Level 1	80	8.32	2.08	1.1	1.7
Level 2	80	10.20	2.54	1.0	1.6
Level 3	80	12.43	3.10	0.8	2.1

b) Urine

Sample	n	Mean		Within-run	Total
		mg/dL	mmol/L	CV (%)	
Level 1	80	3.77	0.94	1.8	3.1
Level 2	80	9.76	2.44	1.5	2.2
Level 3	80	14.72	3.67	1.2	2.0

METHOD COMPARISON

a) Serum/Plasma

A comparative study has been performed between an Envoy 500 Analyzer and an FDA-approved system equipment (enzymatic - colorimetric method) on 100 human serum samples according to CLSI[10] EP9-A2 protocol.
The sample concentrations were between 5.02 and 14.85 mg/dL (1.25 and 3.71 mmol/L).

The parameters of the linear regressions are as follows :
Correlation coefficient: (r) = 0.996
Linear regression: y = 0.961 x + 0.30 mg/dL (0.07 mmol/L)

b) Urine

A comparative study has been performed between an Envoy 500 Analyzer and an FDA-approved system equipment (enzymatic - colorimetric method) on 50 human urine samples according to CLSI[10] EP9-A2 protocol.
The sample concentrations were between 1.57 and 16.74 mg/dL (0.39 and 4.18 mmol/L).

The parameters of the linear regressions are as follows :
Correlation coefficient: (r) = 0.996
Linear regression: y = 0.963 x - 0.06 mg/dL (0.01 mmol/L)

INTERFERING SUBSTANCES

a) Serum/Plasma

Studies have been performed to determine the level of interference from different compounds according to CLSI[11] EP7-A2 protocol. Recovery is within ± 10% of initial value at calcium concentration of 8.00 mg/dL and 12.00 mg/dL for low and high concentration accordingly.

Unconjugated bilirubin:	No significant interference up to 30.0 mg/dL (513 µmol/L).
Conjugated bilirubin:	No significant interference up to 29.5 mg/dL (504 µmol/L).
Hemoglobin:	No significant interference up to 500 mg/dL
Triglycerides:	No significant interference up to 1256 mg/dL (14.19 mmol/L).
Magnesium:	No significant interference up to 12.0 mg/dL
Ascorbic acid:	No significant interference up to 20.0 mg/dL (1136 µmol/L).
Acetylsalicylic Acid:	No significant interference up to 200 mg/dL.
Acetaminophen:	No significant interference up to 30 mg/dL.

In very rare cases, monoclonal gammopathies (multiple myeloma), in particular IgM type (Waldenstrom's macroglobulinemia) can cause unreliable results.[12]

Other compounds may interfere.[13,14]

b) Urine

Studies have been performed to determine the level of interference from different compounds according to CLSI[11] EP7-A2 protocol. Recovery is within ± 10% of initial value at calcium concentration of 4.00 mg/dL and 16.00 mg/dL for low and high concentration accordingly.

Conjugated bilirubin:	No significant interference up to 29.5 mg/dL (504 µmol/L).
Hemoglobin:	No significant interference up to 500 mg/dL
Urea:	No significant interference up to 5000 mg/dL (832.50 mmol/L).
Magnesium:	No significant interference up to 10.0 mg/dL (4.11 mmol/L)
Ascorbic acid:	No significant interference up to 20.0 mg/dL.
Uric acid:	No significant interference up to 100 mg/dL (5948 µmol/L).
pH:	No significant interference between pH 2.5 to pH 6.0.

Other compounds may interfere.[13,14]

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Zone Industrielle
61500 SEES
France

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(855) 354-8324 - www.elitechgroup.com
27 Wellington Road
Lincoln, Rhode Island 02865 - U.S.A.

☛REFERENCES

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11. *Interference Testing in Clinical Chemistry ; Approved Guideline* Second Edition. CLSI (NCCLS) document EP7-A2 (2005), **25** (27)
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☛GLOSSARY OF SYMBOLS

CONT	Contents		Manufacturer	REF	Catalog No.
LOT	Batch Code		See instruction for use		Use by
OPENED	Date opened / Installation date	IVD	*In vitro* diagnostic device		Temperature Limitation
STAB DAYS	Number of days onboard stability	R	Reagent		

☛ : Modification from previous version

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