



MAGNESIUM

Calmagite -EGTA. Colorimetric
Quantitative determination of magnesium
Store at 2-8°C

For in vitro diagnostic use only

PRINCIPLE OF THE METHOD

Magnesium form a purple coloured complex when reacts with Calmagite in alkaline solutions ^(Note 1)

The intensity of the color formed is proportional to the magnesium concentration in the sample'.

CLINICAL SIGNIFICANCE

Magnesium is the second more abundant intracellular cation of the human body after potassium, being essential in great number of enzymatic and metabolic processes.

Is a cofactor of all the enzymatic reactions that involve the ATP and comprises of the membrane that maintains the electrical excitability of the muscular and nervous cells.

A low magnesium level is found in malabsorption syndrome, diuretic or minoglucoside therapy; hyperparathyroidism or diabetic acidosis. Elevated concentration of magnesium is found in uremia, chronic renal failure, glomerulonephritis, Addison's disease or intensive anti acid therapy'. Clinical diagnosis should not be made on a single test result; it should integrate clinical and other laboratory data.

REAGENTS

R 1 Buffer	Amino-methyl-propanol EGTA	1 mmol/L 0.21 mmol/L
R 2 Chromogen	Calmagite	0.30 mmol/L
MAGNESIUM STD	Magnesium aqueous primary standard 2mg/dl	

PREPARATION

Working reagent (WR):

Mix equal volumes of R 1 Buffer and R 2 Chromogen.

The working reagent is stable for 4 days at refrigerator (2-8°C) or 24 h at room temperature (15-25°C).

STORAGE AND STABILITY

All the components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8°C protected from light and contaminations prevented during their use.

Do not use reagents over the expiration date.

MAGNESIUM STD: Store at 2-8°C.

The Standard is stable until the expiry date stated on the label.

Signs of reagent deterioration:

- Presence of particles and turbidity.
- Blank absorbance (A) at 520 \geq 1.4.

ADDITIONAL EQUIPMENT

- Spectrophotometer or colorimeter measuring at 520 nm
- Matched cuvettes 1.0 cm light path.
- General laboratory equipment ^(Note 2)

SAMPLES

– Serum, heparinized plasma:

Free of hemolysis and separated from cells as rapidly as possible. Do not use oxalates or EDTA as anticoagulant.

Stability: 7 days at 2-8°C.

– Urine:

Should be acidified to pH 1 with HCl.

If urine is cloudy; warm the specimen to 60°C for 10 min. to dissolve precipitates.

Dilute the sample 1/10 with distilled water and multiply the result by 10.

Stability: 3 days at 2-8°C

PROCEDURE

1. Assay conditions:

Wavelength : 520 nm (500-550)

Cuvette: 1 cm light path

Temperature 37°C / 15-25°C

2. Adjust the instrument to zero with distilled water.

3. Pipette into a cuvette:

	Blank	Standard	Sample
WR (mL)	1.0	1.0	1.0
Standard (μL)		10	--
Sample (μL)	--	--	10

4. Mix and incubate for 5 min at room temperature or 3 min at 37°C.

5. Read the absorbance (A) of the samples and calibrator, against the Blank.
The colour is stable for at least 30 minutes.

CALCULATIONS

$(A)_{\text{Sample}} \times 2 = \text{mg/dL}$ magnesium in the sample

$(A)_{\text{Standard}}$

Conversion factors:

$\text{mg/dL} \times 0.412 = \text{mmol/L}$

or

$0,5 \text{ mmol/L} = 1.0 \text{ mEq/L} = 1,22 \text{ mg/dL} = 12,2 \text{ mg/L}$.

QUALITY CONTROL

Control sera are recommended to monitor the performance of assay procedures: ATLAS Control H Normal and Pathologic.

If control values are found outside the defined range, check the instrument, reagents and calibrator for problems.

Each laboratory should establish its own Quality Control scheme and corrective actions if controls do not meet the acceptable tolerances.

REFERENCE VALUES

Serum or plasma:

1.6 – 2.5 mg/dL = 0.66 – 0.03 mmol/L

Urine:

24 – 244 mg/24 h = 2 – 21 mEq/L/24 h

These values are for orientation purpose; each laboratory should establish its own reference range.

PERFORMANCE CHARACTERISTICS

Measuring range: From *detection limit* of 0.2 mg/L to *linearity limit* of 5 mg/d L. If the results obtained were greater than linearity limit, dilute the sample 1/2 with NaCl 9 g/L and multiply the result by 2.

Precision:

Mean mg /dL	Intra-assay (n=20)		Inter-assay (n=20)	
	2.39	4.01	2.27	4.14
SD	0.02	0.07	0.07	0.13
CV (%)	1.18	1.73	2.99	3.22

Sensitivity: 1 mg/dL = 0.055 A.

Accuracy: Results obtained using ATLAS reagents (y) did not show systematic differences when compared with other commercial reagents (x). The results of the performance characteristics depend on the analyzer used.

INTERFERENCES

Hemolysis and anticoagulants other than heparin.

A list of drugs and other interfering substances with magnesium determination has been reported by Young et. al².

NOTES

1. Interference by calcium is prevented by the use of EGTA.
2. It is recommended use disposable material to avoid calcium or magnesium contamination. If glassware is used the material should be scrupulously clean with HzSO₄- KzCrzO₇ and then thoroughly rinsed with distilled water and dried before use.
3. Calibration with the aqueous standard may cause a systematic error in automatic procedures. It is recommended to use a serum Calibrator.
4. Use clean disposable pipette tips for its dispensation.
5. **ATLAS has instruction sheets for several automatic analyzers. Instructions for many of them are available on request.**

BIBLIOGRAPHY

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