Magnesium Liquid Reagent

Order No.	Description
R85207	4 x 120 mL

INTENDED USE

The reagent is intended for the quantitative in vitro determination of magnesium in serum or plasma.

TEST SUMMARY

Older methods for determination of magnesium were based on precipitation in the form of magnesium ammonium phosphate, followed by determination of phosphate in the precipitate. Complexometric techniques using EDTA have been employed. Fluorometric methods have been presented, one of which has been automated. The definitive method is by neutron activation analysis, while the procedure of choice uses atomic absorption (1). Direct magnesium determinations employing spectrophotometric methods without deproteinization of the samples have been described. These use calmagite, methylthymol blue and Titan yellow.

The sodium salt of Xylidyl Blue I (Magon sulfonate-CAS registry number: 14936-97-1) is 4-hydroxy-3-[2-hydroxy-3-(2,4-dimethyl-phenyl amino carbonyl)-1-naphthylazo] benzene sulfonic acid (2) and is used in our procedure. This compound forms a red complex in alkaline solution with magnesium. The absorbance at 520 nm of the red Xylidyl Blue I: magnesium complex is proportional to the concentration of magnesium in the sample. Interference by calcium is prevented by the use of EGTA [ethylenebis (oxyethylene nitrilo) tetraacetic acid].

REAGENT COMPOSITION

Reactive ingredients:

Xylidyl Blue I	0.14 mmol/L

Non-reactive ingredients:

Buffers, stabilizers and fillers

REAGENT PREPARATION

The reagent is in liquid form, ready for use.

REAGENT STORAGE AND STABILITY

The reagent in the unopened containers is stable at 2–25 °C until the expiration date indicated on the container.

Do not use the reagent if it becomes turbid or fails to recover known serum control values.

Avoid contamination of the reagents. Magnesium is present in a number of products used as detergents, in tap water, etc.

PRECAUTIONS

Good laboratory safety practices should be followed when handling any laboratory reagent. Refer to a recognized laboratory safety program for additional information. (See GP17-T, Clinical Laboratory Safety; Tentative Guideline (1994), National Committee on Clinical Laboratory Standards, Wayne, PA.)

Intended for in vitro diagnostic use only.

INTERFERING SUBSTANCES

Any substance which either chelates magnesium or contains magnesium will interfere with the assay.

Young (3) has published a comprehensive list of drugs and substances which may interfere with in vitro diagnostic assays, including that for serum magnesium.

SPECIMEN COLLECTION, PREPARATION AND STORAGE

The assay may be performed using serum or heparinized plasma. Do not use anticoagulants which are also metal complexing agents, such as oxalate, fluoride or citrate. Separate the serum or plasma from the formed elements of blood as soon as possible to minimize transferral of magnesium from the cells through the cell membranes. Do not use hemolyzed samples as red cells contain a much higher level of magnesium than plasma.

Magnesium in serum or plasma is stable for several days refrigerated. For long term storage, samples should be kept in a freezer.

MATERIALS REQUIRED BUT NOT PROVIDED

1. Spectrophotometer capable of accurate readings at 520 nm.
2. Matched cuvettes.
3. Distilled or deionized water.
4. Accurate pipettes to measure water, reagent and standard.
5. Standard or calibrator with an established value for magnesium concentration.

MATERIAL PROVIDED

Magnesium Reagent in liquid form.

CALIBRATION

This assay requires the use of a magnesium standard. Use Multi-Analyte Serum Calibrator (Cat. No. R60010), or other commercially available standards or calibrators.

QUALITY CONTROL

Serum controls are recommended to monitor the performance of manual and automated assay procedures, providing a continued screening of the instrument, reagent and technique. Commercially available control materials with established values for magnesium concentration may be used. Assayed Control Serum, Level 1 (Cat. No. R83082) and Level 2 (Cat. No. R83083) are recommended for this purpose.

TEST PROCEDURE

The temperature is not critical but must be constant during the assay for samples, blank and standard.

Set up the assay as follows:

Wavelength:	520 nm
Cuvettes, matched	
Test	3 mL reagent + 0.02 mL sample
Standard	3 mL reagent + 0.02 mL standard
Blank	3 mL reagent + 0.02 mL D.I. water

Mix gently by inversion and incubate five minutes at the selected temperature. Set the instrument to zero absorbance with the blank and after five minutes read and record the absorbance of the sample and the standard. The color developed is stable for 20 minutes.

CALCULATIONS

$$\frac{A_{test}}{A_{standard}} \times \text{conc. of standard} = \text{magnesium in mg/dL.}$$

Sample Calculation:

$A_{test} = 0.170$

$A_{standard} = 0.143$

Concentration of standard = 2.0 mg/dL

$$\frac{0.170}{0.143} \times 2.0 = 2.4 \text{ mg/dL.}$$

LIMITATIONS OF THE PROCEDURE

Samples with a magnesium concentration of greater than 6 mg/dL should be diluted with an equal volume of water and reassayed. Multiply the results obtained by 2.

REAGENT PERFORMANCE

1. Linearity: The assay is linear to 6 mg/dL.
2. Correlation: Results obtained using this assay procedure were compared with those obtained using Magnesium Reagent, Enzymatic. A total of 62 serum samples ranging in magnesium concentration from 1.6 mg/dL to 4.9 mg/dL were assayed. The correlation coefficients were 0.990 and 0.986 respectively and the corresponding regression equations were y = 1.03x - 0.0433 and y = 0.964x + 0.0007.
3. Precision:

Within Run			
Mean (mg/dL)	1.20	2.39	4.75
SD (mg/dL)	0.028	0.039	0.041
CV (%)	2.33	1.59	0.86
N	12	12	12
Total			
Mean (mg/dL)	1.21	2.4	4.73
SD (mg/dL)	0.034	0.037	0.046
CV (%)	2.8	1.54	0.97
N	20	20	20

4. Sensitivity: Using a 1:150 sample to reagent ratio and reading at 520 nm, 1 mg/dL magnesium will produce a net absorbance of approximately 0.08.

REFERENCE RANGE

The reference range for magnesium in serum or plasma is 1.8 mg/dL to 2.9 mg/dL (1.5 mEq/L - 2.4 mEq/L) (1). Newborns have essentially the same ranges as adults. It is recommended that laboratories establish their own ranges for magnesium.

REFERENCES

1. Pesce, A.J. and Kaplan, L.A., *Methods in Clinical Chemistry*, p. 1021, The C.V. Morby Company, 1987.
2. Baginski, E.S., Marie, S.S., Karcher, R.E. and Zak, B., in *Selected Methods of Clinical Chemistry*, Vol. 9, p. 277, Amer. Assn. for Clin. Chem., Washington, D.C., 1982.
3. Young, D.S., *Effects of Drugs on Clinical Laboratory Testing*, 3rd Edition, 3.237-3.239, AACC Press, Washington, DC, 1990.

IVD **For in vitro diagnostic use**

See package insert for proper use

CLINIQA CORPORATION
288 Distribution St.
San Marcos, CA 92078
USA

SALES AND TECHNICAL SUPPORT
P: 800 728 5205
+1 760 744 1900
F: +1 760 571 5198
www.cliniqa.com

FOR ORDERS AND CUSTOMER SERVICE
P: 800 728 5205
+1 760 744 1900
F: +1 760 571 5197
csgroup@cliniqa.com

EC REP
CEpartner4U
Esdoornlaan 13
3951 DB Maarn, The Netherlands
P: +31 (0)6 516 536 26

RE-ORDER INFORMATION
Magnesium Liquid Reagent

Catalog No.

REF R85207

Made in the USA

32840_01 11/24/09