TECO DIAGNOSTICS
1268 N. Lakeview Ave.
Anaheim, CA 92807
1-800-222-9880

MAGNESIUM REAGENT SET

INTENDED USE
For the quantitative determination of magnesium in serum.

INTRODUCTION
Magnesium is one of the most abundant cations in the body and is essential to many physiochemical processes. Approximately one-half of the body magnesium is present in the bone. The remainder is found in soft tissues and blood cells with a small amount present in blood. Magnesium is an activator of various enzymes and is also essential for the preservation of the macromolecular structure of DNA, RNA, and ribosomes.[1]

Little is known about the factors regulating magnesium levels in plasma. It is believed that the parathyroid gland may be involved.[2] Decreased levels have been observed in cases of diabetes, alcoholism, diuretics, hyperthyroidism, malabsorption, hyperalimentation, myocardial infarction, congestive heart failure, and liver cirrhosis. Increased serum magnesium levels have been found in renal failure, diabetic acidosis, Addison's disease, and vitamin D intoxication.[2,3]

In terms of accuracy, speed, and convenience, the determination of magnesium by atomic absorption spectrophotometry is the method of choice. However, this method requires expensive instrumentation and uses large samples volumes that limit its use for frequent testing.[4] This procedure is a direct method in which magnesium forms a colored complex with calmagite in a basic solution, where calcium and protein interference is eliminated by EGTA and surfactant.[5]

PRINCIPLE
Magnesium forms a colored complex with calmagite in alkaline medium to produce a red complex that is measured spectrophotometrically at 530 nm. EGTA serves to complex and prevent calcium interference, and a surfactant eliminates the effect of protein. The color produced is proportional to the magnesium concentration.

REAGENT COMPOSITION
1. Magnesium Buffer Reagent:
   2-Ethylaminoethanol 6.0 w/v; potassium cyanide 0.10% w/v, EGTA 1.18 mM. **Caution:** Contains Cyanide, avoid all contact and ingestion.
2. Magnesium Color Reagent:
   Calmagite 0.006% w/v; stabilizer 2.0% w/v; surfactant 0.03% w/v. **Caution:** DO NOT PIPETTE by mouth.
3. Magnesium Standard:
   2 mEq/L magnesium lodate, tetrahydrate.

WARNINGS AND PRECAUTIONS:
1. For *in vitro* diagnostic use only.
2. Exercise the normal precautions required for the handling of all laboratory reagents. Pipetting by mouth is not recommended for any laboratory reagent.

REAGENT PREPARATION
The working reagent is prepared by mixing ten (10) volumes of color reagent with one (1) volume of buffer reagent in a disposable plastic container.
Combine only the volume of reagent necessary to perform the specific number of tests for that day. Working reagent is stable for twenty-four (24) hours at 18 - 25°C.

Disposable plastic containers or acid-washed glass containers are recommended to avoid contamination.

STORAGE AND STABILITY
The reagent kit is stable until the expiration date stated on the label if stored refrigerated between 2 - 8°C. The working reagent is stable for twenty-four (24) hours at 18 - 25°C.

REAGENT DETERIORATION
1. Failure to achieve assayed values on freshly prepared control sera would indicate deterioration.
2. Working reagent becomes visibly turbid.

SPECIMEN COLLECTION
1. Unhemolyzed sera are the recommended sample. Separate from clot as soon as possible.
2. Avoid taking blood from a limb that is simultaneously receiving an infusion.
3. Avoid contamination of blood with tissue fluid.

INTERFERING SUBSTANCES
1. Plasma collected with anticoagulants such as EDTA, citrate and oxalate must not be used.
2. A number of drugs and substances affect the concentration of magnesium. See Young, et al.[6]

MATERIALS REQUIRED BUT NOT PROVIDED
1. Pipetting devices.
2. Test tubes/rack.
3. Timing device
4. Spectrophotometer capable of reading at 530 nm.

PROCEDURE (AUTOMATED)
Consult the appropriate instrument application guide available from Teco.

PROCEDURE (MANUAL)
1. Prepare working reagent according to preparation instruction.
2. Label test tubes: "Blank", "Standard", "Control", "Patient", etc.
3. For each sample, dispense 1.0 ml of working reagent to each tube.
4. Add 0.01 ml (10 µl) sample to its respective tube. Mix gently.
5. Incubate for five (5) minutes at room temperature.
6. After incubation, zero spectrophotometer with the reagent blank at 530 nm. (Wavelength range: 500-550 nm).
7. Read and record absorbances of samples.

* TC - MULTI PURPOSE CALIBRATOR MAY BE USED TO REPLACE STANDARD.

NOTE: Final color is stable for at least thirty-minutes at room temperature.

CALCULATIONS
Abs.= Absorbance

$$\frac{\text{Abs. of Unknown}}{\text{Abs. of Standard}} \times \text{concentration of standard} = \text{concentration of unknown in mEq/L}$$

Example: Abs. of unknown = 0.098
Abs. of standard = 0.113
Concentration of standard = 2.0 mEq/L

Then $\frac{0.098}{0.113} \times 2 \text{ mEq/L} = 1.73 \text{ mEq/L}$

NOTE: If it is necessary to report magnesium in mg⁄dl instead of mEq⁄L, multiply the mEq⁄L value by 1.215 to obtain magnesium in mg⁄dl.

QUALITY CONTROL

It is recommended that controls be included in each set of assays. Commercially available control material with established magnesium values may be used for quality control. The assigned value of the control material must be confirmed by the chosen application. Failure to obtain the proper range of values in the assay of control material may indicate reagent deterioration, instrument malfunction, or procedural errors.

EXPECTED VALUES[3]

Adults 1.3 - 2.5 mEq/L

PERFORMANCE CHARACTERISTICS

1. Linearity: 4.0 mEq/L (4.86 mg/dl).
2. Comparison: Studies between the present method and a similar calmagite method yielded a coefficient correlation of 0.96 with a regression equation of y = 0.98x + 0.09 sample values ranged from 1.5 mEq/L to 2.8 m Eq/L.
3. Precision studies:

	Within Run	
Mean (mg/dl)	S.D.	C.V.
1.7	0.1	5.7%
3.7	0.2	6.0%

	Run-to-Run	
Mean (mg/dl)	S.D.	C.V.
1.7	0.1	5.7%
3.8	0.1	2.2%

REFERENCES

1. Henry. J.B.: *Clinical Diagnosis and Management,* 17th ed., W.B. Saunder Co., Philadelphia, p. 157 (1984).
2. Faulkner, W.R.: Selected Method for the Small Clinical Chemistry Laboratory, "Magnesium in Biological Fluids." AACC Washington, D.C., p. 277 (1982).
3. Tietz, N.W.: *Fundamentals of Clinical Chemistry*, W.B.Saunders Co., Philadelphia, p. 919 (1976).
4. Natelson, S.: *Techniques of Clinical Chemistry,* 3rd Ed., Thomas, C.C., Springfield, IL, p. 190 (1971).
5. Gindler, E.M. and Heth, D.D.: *Clin. Chem.* 17:662 (1971).
6. Young, D.S., *et al., Clin. Chem.* 21:ID-425D (1975).

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Manufactured by:

TECO DIAGNOSTICS
1268 N. LAKEVIEW AVE.
ANAHEIM, CA 92807
U.S.A.

CE EC REP

EMERGO EUROPE
Prinsessegracht 20
2514 AP The Hague
The Netherlands