*Spectrophotometric Determination of*
*Magnesium with Pontachrome*
*Azure Blue B.*

By Katsuya Uesugi, Yukiteru Katsube
and John H. Yoe

A new spectrophotometric method for the determination of traces of magnesium has been developed. It is based upon the stable reddish-violet magnesium complex of sodium 2'', 6''-dichloro-4'-hydroxy-3, 3'-dimethylfuchsone-5, 5'-dicarboxylate (Pontachrome Azure Blue B).

Details of this compound have been published in our recent paper[1].

Absorption spectra of the reagent solution (Fig. 1. curve I) and of its magnesium complex (Fig. 1. curve II) indicate the analytical usefulness of this color reaction. At pH 11, the maximum absorbance is at 570 m$\mu$. The complex is formed by adding a small amount of magnesium to the mixture of 5.0 ml. of ammonium chloride-ammonia buffer solution and 2.0 ml. of 0.2% reagent solution in a 25 ml. volumetric flask. The solution is diluted to the mark with distilled water and thoroughly mixed. As seen in Fig. 2, magnesium complex has a maximum absorbance in the pH range 10.8 to 11.4 ($\lambda_{max}$ 570 m$\mu$). Full color developes
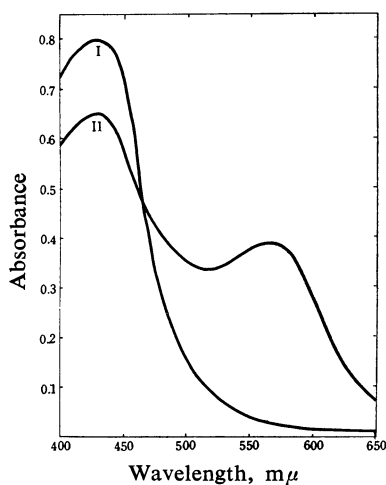


Fig. 1. Absorption spectra of the reagent solution and of its magnesium complex. pH 11.0
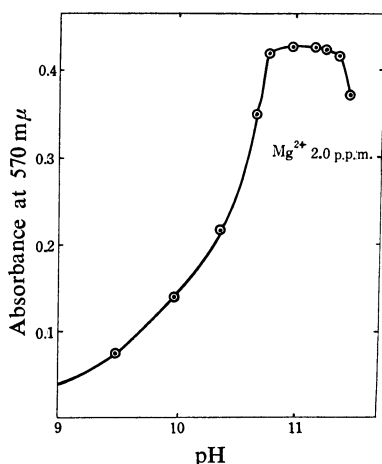I: Reagent 40 p.p.m.
II: Reagent (40 p.p.m.)+Mg(10 p.p.m.)
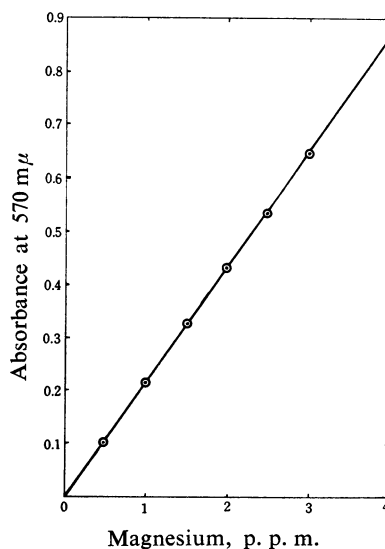


Fig. 2. Effect of pH on the magnesium complex.



Magnesium, p. p. m.
Fig. 3. Beer's law curve. pH 11.0.

TABLE I. LIMITING CONCENTRATION OF INTERFERING IONS FOR DETERMINATION OF MAGNESIUM

| Ion | Added as | Limiting concn.* p. p. m. |
|---|---|---|
| $Be^{2+}$ | Chloride | 0.5 |
| $UO_2^{2+}$ | Nitrate | 2.0 |
| $Fe^{3+}$ | Sulfate | 0.5 |
| $Fe^{2+}$ | Mohr's salt | 0.4 |
| $Cu^{2+}$ | Sulfate | 0.1 |
| $Ca^{2+}$ | Chloride | 0.7 |
| $Co^{2+}$ | Nitrate | 0.9 |

* The limiting concentration was taken to be one that causes a deviation of more than 0.01 unit in the absorbance of a solution containing 2.5 p.p.m. of magnesium.

within ten minutes and its stability is quite adequate for the determination of magnesium.

Beer's law is obeyed up to a magnesium concentration of at least 4 p.p.m. (Fig. 3). The sensitivity of the color reaction is 0.004 $\mu$g. Mg/cm$^3$ for log $(I_0/I) = 0.001$. The limiting concentrations of the common cations are given in Table I. It will be seen that many metal ions must be removed or masked before the determination.

The presence of these interfering metal ions gives the smaller absorbance at 570 m$\mu$. For example, in the presence of 2 p. p. m. of calcium the absorbance is decreased about 50%.

Himeji Technical Institute
Idei-600 Himeji
(K. U. and Y. K.)
John Lee Pratt Trace Analysis Laboratory
University of Virginia
Charlottesville, Va.
U. S. A.
(J. H. Y.)

1) Y. Katsube, K. Uesugi and J. H. Yoe, This Bulletin, 34, 72 (1961).