A New Spectrophotometric Method for the Determination of Magnesium with Sodium *p*-Aminobenzene-azo-1, 8-dihydroxynaphthalene-3, 6-disulfonate

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A new spectrophotometric method for the determination of traces of magnesium has been developed. It is based upon the formation of a stable bluish-violet magnesium complex of sodium *p*-aminobenzene-azo-1, 8-dihydroxynaphthalene - 3, 6 - disulfonate (pontacyl violet 4BSN).

The absorption spectra of the complex are shown in Fig. 1. At pH 11, the maximum absorbance is at 580 mμ. The complex is formed by adding a microgram of magnesium to the mixture of 5.0 ml. of an ammonium chloride - ammonia buffer solution and 2.5 ml. of a 0.2% reagent solution in a 25 ml. volumetric flask. The solution is diluted to the mark with distilled water and thoroughly mixed. The full color develops within five minutes, and its stability is quite adequate for the determination of magnesium. As may be seen in Fig. 2., the magnesium complex has a maximum absorbance in the pH range from 10.8 to 11.3 (λ_{max} 580 mμ). Beer's law is obeyed up to a magnesium concentration of 1.0 p. p. m. (Fig. 3, curve 1). At 580 mμ, the molar extinction coefficient is about 19300, and the sensitivity is 0.0013 μg. Mg/cm^2 that corresponds to log $I_0/I=0.001$.

The presence of acetone increases the sensitivity of the reagent to magnesium about 60%. In the addition of 20% vol./vol. with respect to acetone, Beer's law is obeyed up to a magnesium concentration of at least 0.8 p. p. m.

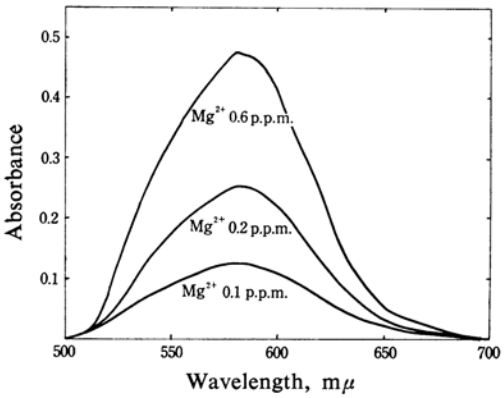

Fig. 1. Absorption spectra on the Mg-complex.
pH 11, reagent 200 p. p. m., against reagent blank.

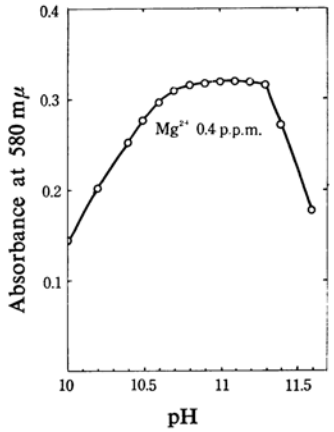

Fig. 2. Effect of pH on the absorbance of the Mg-complex.

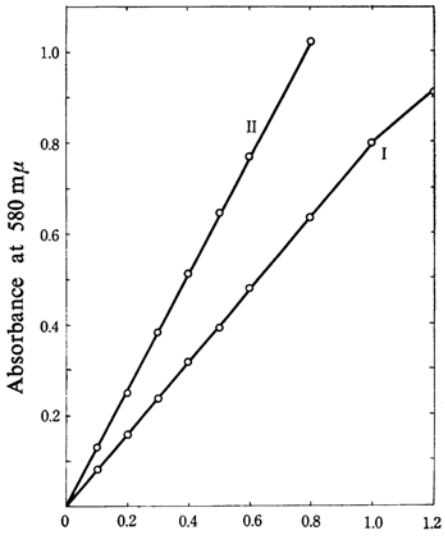

Fig. 3. Beer's law curve.
pH 11. I acetone — II acetone 20%

(Fig. 3, curve II). At 580 mμ, the molar extinction coefficient is about 31300, and the sensitivity is 0.0008 μg. Mg/cm^2 that corresponds to log $I_0/I=0.001$.

Strontium and barium in concentrations up to 10 p. p. m. do not interfere. Calcium in amounts up to 2 p. p. m. also does not interfere; however, the presence of more than that causes a positive error. Chloride, sulfate, and nitrate in concentrations up to 500 p. p. m. have no effect. More than 1000 p. p. m. of chloride leads to poor results.

The details of this study will be reported elsewhere.

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