A New Colorimetric Method for the Determination of Beryllium with Sodium *p*-Chlorophenol-azo-1, 8-dihydroxynaphthalene-3, 6-disulfonate

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A new colorimetric method for the determination of traces of beryllium has been developed. It is based upon the stable blue beryllium complex of sodium *p*-chlorophenol-azo-1, 8-dihydroxynaphthalene-3,6-disulfonate in an aqueous solution. This compound has been used for the colorimetric determinations of calcium and magnesium in serum,[1] urin[2] and cast iron[3].

The absorption spectra of the beryllium complex are shown in Fig. 1. At pH 6.5, the maximum absorbance is found at 610 mμ. The complex is formed by adding a small amount of beryllium to the mixture of 10 ml. of a sodium acetate - acetic acid buffer solution and 2.0 ml. of a 0.1% reagent solution in a 25 ml. volumetric flask. The solution is diluted to the mark with distilled water and thoroughly mixed. The beryllium complex has a maximum absorbance in the pH range from 6.2 to 6.8. The color under these conditions develops completely within 10 min. and is stable for at least 30 min. There is no variation in the absorbance of the color over the temperature range of 10 to 30°C. When the color is measured spectrophotometrically at its absorption peak, 610 mμ, the beryllium complex obeys Beer's law within the range from 0.02 to 0.3 p.p.m. of beryllium (Fig. 2).

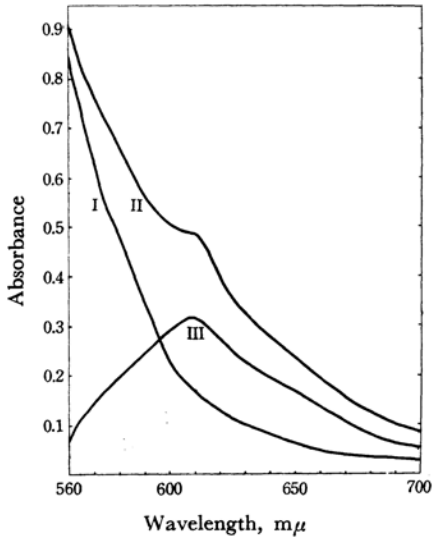

Fig. 1. Absorption spectra. pH 6.5

I. Reagent (40 p.p.m.), against water
II. Reagent (40 p.p.m.) + Be (0.28 p.p.m.), against water
III. Reagent (40 p.p.m.) + Be (0.28 p.p.m.), against reagent blank

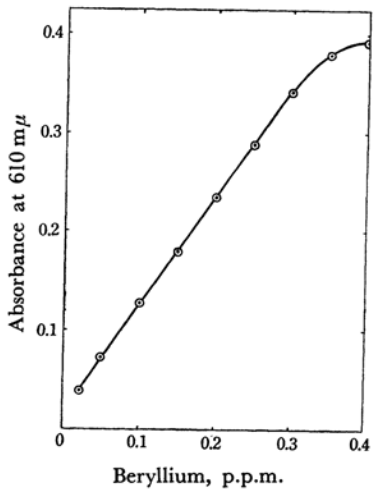

Fig. 2. Beer's law curve. pH 6.5

At 610 mμ, the molar extinction coefficient is about 11000, the sensitivity being 0.0008 μg. Be/cm^2, corresponding to log $I_0/I=0.001$.

5 μg. of beryllium can be determined satisfactorily in the presence of 50 μg. of iron (II, III), manganese(II), calcium and magnesium. Copper-(II), aluminum, zinc, cobalt and nickel interfere.

Further, detailed studies are now in progress.

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2) G. R. Kingsley, *Anal. Chem.*, **29**, 615 (1957).
3) K. Ota, *J. Japan Inst. Metals, Sendai*, **24**, 46 (1960).