SHORT COMMUNICATIONS

Ultraviolet Spectrophotometric Determination of Iron with Ethylenediaminetetraacetic Acid

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It was found that in acid medium ferric iron together with ethylenediaminetetraacetic acid (EDTA) develops an intense absorption in the ultraviolet region due to the formation of a complex which may be successfully utilized to a spectrophotometric determination of iron.

The procedure used in this study is as follows: an excess EDTA is added to a hydrochloric acid solution containing ferric iron, and the solution diluted to a definite volume. The resulting solution is 0.1N as to hydrochloric acid and 0.001M as to EDTA. The transmittancy measurements are made with a Beckman Model DU spectrophotometer equipped with 1 cm. silica cells, a blank of distilled water being referred to.

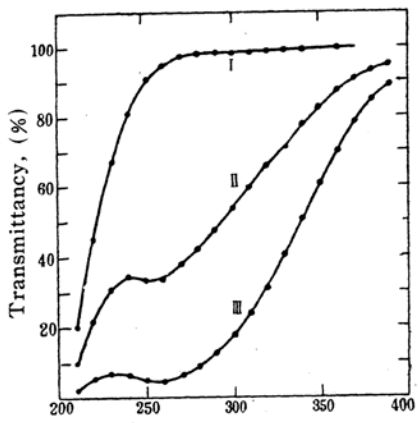

Fig. 1. Absorption spectra of ferric-ethylenediaminetetraacetic acid.
I: without iron, II: 5.0×10^{-4} M and III: 1.5×10^{-4} M ferric iron solution.

In Fig. 1, curve I shows the absorption spectrum of EDTA itself obtained by the said procedure; curves II and III represent the absorption spectra of ferric-EDTA complex solutions which contain 5×10^{-5} mol. and 1.5×10^{-4} mol. ferric iron per litre respectively. The latter solutions are characterized by a transmittancy minimum at 260 mμ.

Fig. 2 gives the calibration curve for iron

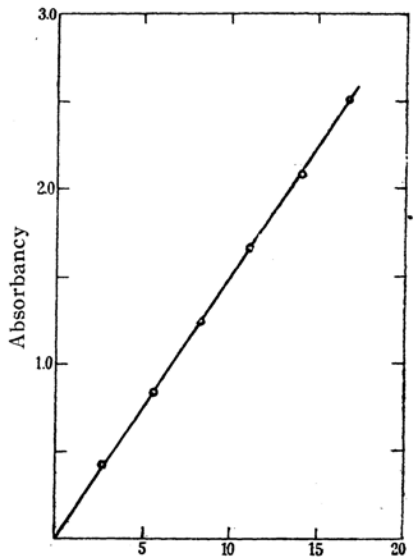

Fig. 2. Calibration curve for iron.

at 260 mμ. The ferric-EDTA complex is stable and its molar absorbancy index at the absorption peak is somewhat larger than

that of ferric-thiocyanate complex in the visible region.

The application of Job's continuous variations method reveals that one mole of ferric iron combines with one mole of EDTA.

Sulfuric acid as well as hydrochloric acid can be used in this determination, and the absorbancy remains constant over the range of 0.001 to 0.3N acid concentrations.

The work is being continued and its results will be reported in detail later.

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