

Extraction of the Bismuth-Thiourea Complex with Tributyl Phosphate from a Perchloric Acid Medium

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Though the colorimetric method for bismuth based on the formation of a bismuth-thiourea complex has been widely known, the literature does not seem to contain any report on the solvent extraction of the complex compound.

The present writers have found, however, that the complex can be quantitatively extracted with tributyl phosphate from a perchloric acid solution with an acidity ranging from 0.1 to 0.6 M.

The absorption curve of the extract, exactly like that of the aqueous solution, has two absorption peaks due to the complex. They are located at 322 nm and 470 nm, their molar absorptivities being 2.45×10^4 and 6.97×10^3 respectively. The 470 nm peak is thought to be better for analytical purposes, in spite of its lower sensitivity, since the 322 nm peak suffers more from the interference of diverse ions and has a poorer reproducibility. Beer's law is obeyed up to 45 $\mu\text{g./ml.}$ of bismuth when the absorbance is measured at 470 nm. The colored system is stable for at least 3 hr.

Chloroform, carbon tetrachloride, benzene, methyl isobutyl ketone, ethyl ether, *n*-butyl

alcohol and butyl acetate do not extract the complex.

On the basis of these observations we propose the following procedure:

A sample solution containing up to 400 $\mu\text{g.}$ of bismuth is taken in a separatory funnel; 2.5 ml. of 60% perchloric acid and 25 ml. of 12% thiourea solution are added, and the solution is diluted to 50 ml. with water. Then exactly 10 ml. of tributyl phosphate is added, and the funnel is vigorously shaken for 2 min. Twenty minutes after the extraction the absorbance of the organic phase is measured at 470 nm. in a 1 cm. cell.

Osmium, ruthenium, and palladium interfere seriously with the determination of bismuth. Molybdenum and antimony also interfere to some extent.

A full paper will be published soon in Japanese.

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