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Spectrophotometric Determination of Copper(II) with 1-Benzoyl-3-(2-pyridyl)-2-thiourea

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Spektralphotometrische Bestimmung von Kupfer(II) mit 1-Benzoyl-3-(2-pyridyl)-2-thioharnstoff

Best. von Kupfer(II) mit 1-Benzoyl-3-(2-pyridyl)-2-thioharnstoff; Spektralphotometrie

A procedure is presented here for the rapid extraction and spectrophotometric determination of copper(II) using 1-benzoyl-3-(2-pyridyl)-2-thiourea as reagent. The absorbance of the coloured complex formed is stable for more than 48 h. Beer's law is obeyed within the range of 5–35 µg of Cu. The composition of the complex has been found to be 1:2 (Cu:reagent). Sensitivity according to Sandell is 3.36×10^{-3} µg/cm². Relative mean deviation is 0.7%. Time required for one determination is 15 min. Tolerance limits for foreign ions can be seen from Table 1. Strong interferences are caused by Cr⁶⁺, Mn²⁺, V⁵⁺, Fe³⁺, Th⁴⁺ and Ce⁴⁺. Iron, however, can be masked by triethanolamine and then does not interfere up to 300 µg. Optimum working conditions have been incorporated in the following direction.

Table 1. Effect of diverse ions. [Cu] = 25 µg, pH 5.0

Tolerance limit	Ion present
1.0×10^4	Na ⁺ , K ⁺ , NO ₃ ⁻ , Cl ⁻ , SO ₄ ²⁻
5.0×10^3	Ca ²⁺ , Ba ²⁺ , Sr ²⁺ , UO ₂ ²⁺ , PO ₄ ³⁻ , S ₂ O ₃ ²⁻ , Br ⁻ , I ⁻ , F ⁻ , tartrate
1.0×10^3	Ni ²⁺ , Pb ²⁺ , Bi ³⁺ , Zr ⁴⁺ , Mo ⁶⁺ , Mg ²⁺
5.0×10^2	Zn ²⁺ , Co ²⁺ , Pd ²⁺ , Cd ²⁺ , NO ₂ ⁻ , EDTA, malonate
1.0×10^2	SCN ⁻ , C ₂ O ₄ ²⁻ , CH ₃ COO ⁻ , citrate

Procedure. Mix 5 ml of sample solution (containing about 25 µg of Cu) with 4 ml of 10^{-4} M alcoholic reagent solution. (The reagent is prepared by reaction of benzoylisothiocyanate with 2-aminopyridine in acetone medium.) Adjust the pH to 5.0 with HCl and NaOH solutions, fill up to 25 ml and shake with two 5 ml portions of chloroform for 2 min each. Withdraw the organic layers into a 10 ml flask and make up to the mark. Measure the absorbance at 340 nm against a reagent blank. Prepare a calibration curve accordingly.

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