Spectrophotometric Determination of Traces of Gold with N-substituted Phenothiazines

H. Sanke Gowda and P. G. Ramappa

Post-graduate Dept. of Chemistry, Manasa Gangotri, Mysore, India

Received July 30, 1975; revised October 30, 1975

Spektralphotometrische Bestimmung von Goldspuren mit N-substituierten Phenothiazinen

Best. von Gold mit Phenothiazinen; Spektralphotometrie; N-subst. Verb.

N-substituted phenothiazines form coloured oxidation products with gold(III) in hydrochloric acid medium. Absorption maxima and molar absorptivities of these compounds are: for diethazine hydrochloride (DH) 518 nm; 1.6×10^4 ; for prochlorperazine maleate (PPM) 530 nm; 2.05×10^4 ; for trifluoroperazine hydrochloride (TFP) 502 nm; 1.52×10^4 and for thioridazine hydrochloride (TH) 640 nm; 1.89×10^4 l mol⁻¹ cm⁻¹. The first three derivatives give full development of colour intensity in hydrochloric acid media ranging from 0.5–5.0 M and the fourth one in aqueous solution at pH 1.5–3. A 18-fold molar concentration of DH, 7-fold molar concentration of PPM, 40-fold molar concentration of TFP or 27-fold molar concen-

tration of TH is necessary for the full development of colour intensity. Beer's law is valid over the concentration range of 0.2–9.0 ppm of Au for DH, 0.1 to 6.0 ppm of Au for PPM, 0.5–8 ppm of Au for TFP and 1.0–6.0 ppm of Au for TH. The relative error is $\leq \pm 2\%$. PPM is the most sensitive of these reagents (0.0096 µg of Au/cm² according to Sandell) and is therefore recommended for use. Alkali and alkaline earth metals do not interfere. Serious interferences are caused by oxidizing ions and by platinum metals. Complexes formed with Pd and Pt can be removed by extraction with chloroform. Tolerance limits for some ions (in µg) are as follows: F⁻ 3600, Cl⁻ 3000, Br⁻ 2800, I⁻ 0.4, NO₃⁻ 1600, SO₄²⁻ 2400, S₂O₃²⁻ 0.2, PO₄³⁻ 2000, CH₃COO⁻ 1200, citrate 400, oxalate 2200, EDTA 200, Pd²⁺ 0.4, Pt⁴⁺ 6, Ru³⁺ 0.2, Os⁸⁺ 0.6, Rh³⁺ 6, Ir³⁺ 20, Fe³⁺ 5, Co²⁺ 400, Ni²⁺ 1600, Cu²⁺ 600, Ag⁺ 10, U⁶⁺ 2000, Ce⁴⁺ 2.

Working Procedure. Transfer the sample solution containing 2.5–150 µg of gold into a 25 ml volumetric flask, add 5 ml of 10 N hydrochloric acid and 4 ml of an aqueous solution of PPM and dilute to the mark with double-distilled water. Mix thoroughly and measure the absorbance at 530 nm against a blank prepared in the same way. Take the gold concentration from an appropriate calibration curve.

Prof. Dr. H. Sanke Gowda, Post-graduate Dept. of Chemistry, University of Mysore, Manasa Gangotri, Mysore-570006, India