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Adsorptive cathodic stripping voltammetric determination of gold(III) in the presence of yeast mannan

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Abstract

Adsorptive cathodic stripping voltammetric (AdCSV) studies of gold(III) on a glassy carbon electrode and in the presence of yeast mannan are reported. These studies give evidence of the formation of a complex between gold(III) and mannan in acid media as judged by the enhancement in the AdCSV currents and shift in the reduction peak of gold(III) in the presence of mannan. The AdCSV currents were linearly dependent on gold(III) concentrations ranging from 7.0×10^{-7} to 3.0×10^{-4} mol dm⁻³. A detection limit of 6.0×10^{-8} mol dm⁻³ was obtained. Interferences of copper(II) were observed in the presence of mannan, but there was no significant interference of silver(I). © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

The accurate, sensitive and selective determination of gold continues to be of interest in analytical chemistry research. Many metals can be conveniently determined by anodic stripping voltammetry (ASV). The main problem with electrochemical stripping analysis of gold(III) is to find a working electrode onto which gold can be deposited for subsequent stripping. Even though gold(III) is easily reduced, deposition of elemental gold onto carbon or platinum electrodes is hampered by the slow nucleation process [1,2]. However, at relatively high concentrations

(>200 µg l⁻¹), gold(III) may be determined with some reproducibility on these electrodes [1]. The electro-deposition of gold onto carbon or platinum electrodes is affected by several factors such as pH, complexing agents, electrolyte and other metal ions present in solution [3–7]. Even though both platinum and carbon electrodes have been shown to be the preferred electrode material for the determination of gold(III) ions in solution, the later suffers from high background current when low gold(III) concentrations are analyzed [8]. In order to improve on the efficiency of gold deposition on carbon electrodes, co-deposition with other metals and activation of the electrode with small amounts of gold have been reported [1,7].

Gold(III) is readily reduced to gold(I) at pH's greater than 2 [9]. Thus, the stripping voltammetry

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