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Sensitive inorganic arsenic speciation on a voltammetric platform in environmental water samples

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Abstract

Speciation of inorganic As using linear sweep voltammetry (LSV) on a gold (Au) working electrode was successfully carried out in environmental water samples. The linear calibration range was established from 0 - 80 $\mu\text{g/L}$ As(III). The precision and accuracy of the method was tested using 50 $\mu\text{g/L}$ As(III) standard solution. For precision analysis, the relative standard deviation (RSD; $N = 6$) of 5.3% was obtained for As(III) standard while for accuracy analysis, RSD ($N = 3$) was 10%. The limit of detection of the method was found to be 0.763 $\mu\text{g/L}$ [As(III)]. The sensitivity of the method determined from the calibration was 224.7 nA/ μM . The interference from Cu(II) was also evaluated, where its concentration up to 200 $\mu\text{g/L}$ did not affect the As(III) stripping peak. The proposed method was applied for As speciation in environmental water samples from rivers around two mining regions; Gold Ridge Mine in the Solomon Islands and Sabeto in Fiji which provided reproducible and accurate results for total inorganic As, As(III) and As(V). As(III) present in the sample was first quantified using the LSV method. As(V) present in the sample was then reduced to As(III) by reaction with Na_2SO_3 and determined as total As(III) using the same method.

Keywords: Arsenic; Speciation; Anodic stripping voltammetry

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1. Introduction

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