Interference Studies for Antimony by Hydride Generation Atom Trapping Slotted Quartz Tube Flame Atomic Absorption Spectrometry

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For any analytical technique, elimination of possible interferences is crucial in order to obtain accurate results [1]. According to Dedina and Tsalev, interferences can be categorized not only as spectral and nonspectral interferences but also as liquid phase and gas phase interferences [2]. Liquid-phase interference can occur during either hydride formation or its transfer from the solution due to changes in the hydride release rate, release kinetic interference, and/or decrease in hydride release efficiency, release efficiency interferences. There are numerous interferences in the liquid phase and all of them can be divided into two basic groups: compound and matrix [2]. Gas phase interferences are caused by an interferent in volatile form or as a liquid spray [3]. The magnitude of interferences depends on the type of hydride generation system, the concentrations of the reducing agent and acid and the type of atomizer used. In this study the interferences studies were done in two techniques, namely hydride generation atom trapping slotted quartz tube flame atomic absorption spectrometry (HG-SQT-AT-FAAS) and hydride generation quartz tube atomizer atomic absorption spectrometry (HG-QTA-AAS). Co values for HG-SQT-AT-FAAS and HG-QTA-AAS are 0.48 and 2.22 ng/mL, respectively. Both of the techniques have the common HG stage; the difference between them is in the atomization stage. The optimum conditions of the respective techniques are 1.2% (m/v) NaBF4 with 0.5% (m/v) NaOH, 0.6% (v/v) HCl, 5 mL/min flow rate for both NaBH4 and acidified sample solutions, and 350 mL/min Ar gas flow. In HG-SQT-AT-FAAS, analyte species were introduced through the nebulizer and trapped in SQT using a sample of 20.0 mL in 4.0 minutes. The trapped species were re-volatilized by introducing 30 uL of methylisobutylketone. In HG-QTA-AAS, analyte species were introduced through the inlet arm of QTA. Interference study was performed to determine the effect of Sn, Pb, As, Se, Fe and Ni on analyte signal. Interferent/analyte (mass/mass) ratio was kept at 1, 5, 10, 20, 50, 100, 500 and 1000; antimony concentration was kept constant at 20, 50, 100 ng/mL for HG-SQT-AT-FAAS and 100 ng/mL in HG-QTA-AAS. In the case of HG-SQT-AT-FAAS, interference effects are significantly reduced as compared with HG-QTA-AAS indicating that the former is a powerful alternative the determination of antimony.

KEYWORDS: antimony, interference, atomic absorption spectrometry, atom trapping

REFERENCES: