Abstract

This bachelor thesis is focused on the investigation of the influence of selected chemical individuals on the determination of antimony by UV-photochemical generation of volatile compounds with atomic fluorescence spectrometry detection (UV-PVG-AFS). Antimony, as a toxic semimetal occurring mainly in the trivalent and pentavalent oxidation state, plays an important role in many industries. Its determination is of importance not only from the point of view of analytical chemistry but also for monitoring of its environmental effects and for human health.

For the interference studies with Sb^{5+}, the inorganic ions Br^-, $Cr_2O_7^{2-}$, I^-, CO_3^{2-}, K^+, Cr^{3+}, Cd^{2+}, Co^{2+}, Cu^{2+}, Ni^{2+}, Na^+, Zn^{2+}, the organic solvents acetonitrile, ethanol and methanol, as well as the extraction reagents L-cysteine and 2-mercaptoethanol were chosen. Br^-, $Cr_2O_7^{2-}$, I^-, CO_3^{2-}, K^+, Cr^{3+}, Cd^{2+}, Na^+ and Zn^{2+} were chosen as possible interferents in the determination of Sb^{3+}. Solutions of the interferents were prepared in a medium of acetic acid (35%v/v) and 50 $\mu g\ l^{-1}$ Sb^{3+} or Sb^{5+}. The detection limit of the determination of Sb^{3+} in the flow injection mode analysis was 3.7 $\mu g\ l^{-1}$ for peak area and 1.9 $\mu g\ l^{-1}$ for peak height evaluation. For Sb^{5+} determination, the detection limit was 3.6 $\mu g\ l^{-1}$ for peak area and 2.0 $\mu g\ l^{-1}$ for peak height. The RSD for the 50 $\mu g\ l^{-1}$ concentration of both antimony ions selected for the interference study was less than 5% in all cases.

The increase in UV-photochemical generation efficiency occurred in the presence of certain concentration ranges of Br^-, $Cr_2O_7^{2-}$, I^-, K^+ ions for Sb^{3+} and Cr^{3+}, Co^{2+}, Cu^{2+}, Ni^{2+}, Na^+, Zn^{2+} ions and the organic solvent acetonitrile for Sb^{5+}. In the presence of the organic reagents ethanol, methanol, L-cysteine and 2-mercaptoethanol, the signal of Sb^{5+} was completely suppressed.