Abstract

This bachelor thesis is focused on the interference study of different elements during lead determination using hydride generation technique. For this method tetrahydroborate was used as a reduction agent and hexacyanoferrate as an oxidant agent which dramatically increases efficiency of plumbane formation. Before interference study, significant experimental conditions were optimized. The optimizations include flow rate of carrier gas (argon), concentrations and flow rates of all reagents (HCl, $NaBH_4$, $K_3[Fe(CN)_6]$), atomization temperature and volume of sample loop. Under the optimal experimental conditions, the calibration was constructed and basic characteristics of the method were determined ï sensitivity (0.0012 lÃg^{-1}), limit of detection (3.13 ε g Ã$^{-1}$). For interference measurement another hydride-forming elements (As, Se, Sb, Sn, Bi, Te), significant transition metals (Fe, Ni, Cu, Zn), alkali metal and alkaline earth metal (Na^+, Ca^{2+}) and common anions (Cl^-, SO_4^{2-}, NO_3^-) including acetate anions were selected. Acetate anionswas incorporated to the study as a representative organic molecule. Hydride-forming elements, mainly selenium, were found as most serious interferents. E.g. selenium at low concentration increases absorption signal of lead. On the other hand, selenium at high concentration strongly suppress lead signal. Other strong interferents were antimony, arsenic, copper, tellurium and bismuth. Bismuth was interesting because significant inhibition of lead signals under all concentrations. Practically no interferences were observed when nickel, zinc, iron, chlorides, sulfates and nitrates were added to the solutions.

Keywords

Atomic absorption spectrometry, chemical hydride generation, interferences, interferent, lead, hydrides, plumbane