Abstract

The aim of this master‘s thesis has been to develop and optimize the method of UV-photochemical vapor generation of cadmium volatile compounds for atomic fluorescence spectrometry. Two configurations with different materials wrapped around the low-pressure mercury vapor lamp were tested. I experimentally determined optimal conditions for both systems; the optimalized parametres included selection of photochemical reagent and its concentration, flow rate of liquids and gases, and the lenghth of the reaction coil. After finding the optimal parametres I determined the figures of merit of the method. I found from the measured data that UV-photoreactor with the quartz capillary provided lower limits of detection and thus was more suitable for generation of cadmium volatile compounds. With this arrangement and using the ferrous sulphate heptahydrate as the chemical modifier I obtained limit of detection 2,0 $\mu g \cdot l^{-1}$, limit of determination 7,0 $\mu g \cdot l^{-1}$, linear dynamic rate LOD-50 $\mu g \cdot l^{-1}$ and repeatibility 0,35 %. I also carried out the interference study in my thesis and determined the generation effeciency of cadmium volatile compounds. The interference study shows the influence of mineral acids (HCl, H_2SO_4, HNO_3), their salts ($NaNO_2$, $NaNO_3$) and transition metals (Co, Ni, Cu). Based on literature review I also studied the influence of ions Fe^{2+}, Fe^{3+}, Se and Te as the possible reaction modifiers. The efficiency of UV-photochemical vapor generation of cadmium volatile compounds was found to be 4,5 % in the system with the chemical modifier.

Key words

Cadmium, UV-photochemical vapor generation, atomic fluorescence spectrometry