Abstract

The presented thesis deals with UV-photochemical generation of volatile compounds of Se and Te from various species. The aim of the project was to expand the current state of knowledge by the application of photocatalytic reduction of higher oxidation states of Se and Te for the speciation analysis based on UV-photochemical generation of volatile compounds.

The first step of the study was the assembly of the apparatus for the photocatalysed UV-photochemical generation of volatile compounds. The material of reactor and the whole experimental set-up were based on literature survey and previous research done in our research group. Experiments were directed towards finding the optimum conditions for generation of volatile compounds of selected model elements Se and Te. Se was studied as the element most commonly determined by the UV-photochemical generation of volatile compounds. Conversely, Te was selected as a model analyte representing elements forming less stable volatile compounds.

The second part was the application of the optimised method of photocatalysed UV-photochemical generation of volatile Se compound to the determination of Se in water matrices, liquid certified reference materials and also samples of dietary supplements. TiO2/UV-photochemical generation was also successfully modified to be used with atomic fluorescence spectrometry as a derivatisation step following speciation analysis based on liquid chromatography separation of inorganic and organic selenium species.

The third part of this thesis studied the influence of the sample matrix on the chemical, electrochemical and UV-photochemical generation of volatile Se compounds. It was found out that the sensitivity of Se determination by the electrochemical and UV-photochemical generation of volatile compounds can be notably improved by the use of reaction modifiers. However, these alternative methods have been found more likely to give incorrect results than chemical generation, particularly due to their susceptibility to the presence of inorganic acids and their salts, which are common matrix components.