

## **Abstract (EN)**

The presented dissertation thesis summarizes the new results of electrochemical generation of volatile compounds usable in atomic spectral methods. The main aim of this work is to develop and to characterize new types of electrolytic flow-through cells and to examine their possibilities of determination of arsenic, selenium and antimony by using the electrochemical hydride generation technique coupled with atomic absorption spectrometry with a quartz tube atomizer.

Individual electrolytic cells were designed and constructed to comply with two important requirements. The cathode chamber of the electrolytic cell should have a minimal volume and a high efficiency of analyte conversion to the volatile hydride. Constructed electrolytic cells are divided into the construction groups and described in the experimental part.

Selenium was chosen as the first analyte. The relevant working parameters (such as type, concentration and flow rate of electrolytes, generation current and carrier gas flow rate) were optimized for each newly constructed electrolytic cell. Under the optimal working parameters, the basic characteristics of selenium determination were found out by using electrochemical hydride generation. The electrolytic cells were compared to each other and with the classical electrolytic cell according to the achieved basic characteristics of selenium determination. Afterwards the hydride generation efficiency was estimated for the cells newly constructed in this thesis and for the cells constructed in the diploma thesis as well. The efficiency was found out by comparing the sensitivity of selenium determination with chemical determination. Subsequently the experiments with radioactive isotope  $^{75}\text{Se}$  were carried out to point out the spatial analyte distribution in the electrolytic cells, to investigate the analyte adsorption and to obtain the real generation efficiency of volatile hydride. The second studied analyte was arsenic. The optimization and characterization of arsenic determination was carried out for all electrolytic cells.

Based on the previous results two electrolytic cells (thin-layer and tubular) were chosen to perform the determination of antimony in drinking water. In the case of antimony, the possibilities of increasing the sensitivity of determination by addition of pure oxygen into the experimental apparatus were studied. The interference study was worked out for all three analytes. The interference study describes the mutual influences of other hydride forming elements, further the influences of a few transition metals and common anions and cations. The last part of this work is focused on the possibilities of electrochemical generation of volatile forms of transition metals. These possibilities have not been published in the literature yet. Zinc, silver and gold were chosen for these experiments. The optimization and description of analyte determination were successfully carried out for all analytes. Preliminary studies showed that the volatile forms of analytes in all cases could be identified as a cluster of nano particles of the metals.