



Faculty of Science
CHARLES UNIVERSITY IN PRAGUE



Derivatization Techniques Based on Generation of Volatile Species of an Analyte for Speciation Analysis on Ultratrace Level of Analyte Concentration

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MATCHMAKING EVENT 2013 IN PRAGUE

Aims of the project

- **basic research** with practically outputs (**analyses of environmental samples**)
- current trend: **speciation analysis** in trace and ultratrace concentration level
 - determination of not only the total element content in a sample but moreover also concentration of individual compounds (forms, species) in which the element occurs in a sample
 - significance for determination of sample toxicity because of different toxicity of various possibly present compounds (ions) of an element, e.g.
As(III) x Arsenosugars; Cr(VI) x Cr(III)
 - hyphenated techniques: separation (HPLC, GC, CZE) + element specific detector based on analytical atomic spectrometry (AAS, AFS, ICP-AES or ICP-MS).
 - derivatization step = introduction of the analyte (in form of generated volatile specie) in gaseous phase into the detector with higher efficiency than in case of introduction of liquids
- This leads to increasing sensitivity of the determination of the species, elimination of interfering matrix effects and especially to better detection limits.
- For extremely low analyte concentration, the in-situ trapping in graphite furnace can be also used for improvement of these parameters.

Intended Outputs of the Project

- functional flow-through units for post-column derivatization based on principles of chemical, electrochemical or UV-photochemical generation of volatile form of an analyte
- increasing of sensitivity of the determination using in-situ trapping in graphite atomizer
- application of developed methods for environmental samples analyses
- scientific articles in prestigious journals focused on spectroscopic and analytical issues

Conclusion

- The successful solution of the project will bring substantial benefits for the determination of ultratrace concentrations and of the chemical forms of those elements which can be converted to analytically useful volatile compounds.
- A lot of students will use and visitors will see the up to date analytical atomic spectrometers in Prague after many years. Thousands of people will see the logo of financial support every year.


Budget



Internal Costs

- ☐ publicity activities and related costs (to be covered by the Charles University in Prague) EUR 5.000

External Costs

- ☐ HR-CS AA Spectrometer ContrAA 700 EUR 150.000
 - ☐ atomic fluorescence spectrometer Millennium Excalibur EUR 68.000
 - ☐ consumables (chromatographic columns, high purity chemicals, lab ware etc.) EUR 27.000
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Total

EUR 250.000

