

Outline of the *Trends in Analytical Chemistry* course

21. 9. 2017

doc. RNDr. Michal Roth, CSc.

Compressed fluids in analytical separations. Supercritical fluids and compressed liquids – similarities and differences, applications in chromatography and sample preparation, supercritical fluid chromatography, supercritical fluid extraction, pressurized hot water extraction. Ionic liquids – motivation, properties, applications. Supercritical water as an agent to treat fused silica capillaries.

5. 10. 2017

Mgr. Markéta Vaculovičová, Ph.D.

Nanoparticles in bioanalytical applications. List of nanoparticles used for in vitro and in vivo detection applications and imaging. Highlight of basic properties of various nanoparticle types, which are employed in bioanalysis and diagnostics.

12. 10. 2017

doc. RNDr. Karel Šlais, DrSc.

Preparative and analytical isoelectric focusing. Principles and variants of instrumental arrangement (capillary, gel, preparative channel), detection, staining, standards and pI-markers, applications in analysis of proteins and microorganisms, continuous methods, coupling to liquid chromatography and mass spectrometry. Current results – new electrolyte systems and focusing devices.

19. 10. 2017

RNDr. Pavel Kubáň, Ph.D. DSc.

Application of membrane-based pre-separation techniques in analysis of environmental, biological and clinical samples. New trends in treatment and pre-concentration of complex samples, examples of off-line and on-line couplings with current analytical instruments, examples of practical solutions of real-world problems.

26. 10. 2017

Ing. František Foret, CSc.

Principles of microfabrications for analytical instrumentation. Coupling of microseparation techniques to mass spectrometry.

2. 11. 2017

doc. RNDr. Bohumil Dočekal, CSc.

New approaches in atomic spectroscopy. Laboratories for trace analysis – “clean environment”.

9. 11. 2017

Ing. Karel Klepárník, CSc.

Current instruments for genetic research, medical diagnostics and molecular identification of organisms (principles of capillary electrophoresis and mass spectrometry for DNA analysis,

separation media, laser-induced fluorescence, mutations and polydispersity of DNA, sample preparation for DNA analysis (cloning, restriction fission, DNA amplification by polymerase chain reaction, Sanger sequenation reaction), DNA sequenation, analysis of polymorphism of restriction fragments, ssDNA conformation polymorphism analysis, denaturation analysis, applications of capillary electrophoresis and mass spectrometry for medical diagnostics and molecular identification of organisms. Nanotechnology for genomic DNA sequenation.

16. 11. 2017

doc. RNDr. Petr Kubáň, Ph.D.

Analytical chemistry in point-of-care (POC) diagnostics. Definition of concepts, history, types of POC devices, examples. Indicator papers, lateral flow assays, paper-based microfluidics, portable analysers. Types of reactions, principles, detection. Example applications from our laboratory. New trends.

23. 11. 2017

Mgr. Jana Křenková, Ph.D., Ing. Dana Moravcová, Ph.D.

Monoliths in separation techniques. A short overview of monoliths employed in separation techniques with emphasis on synthesis, characterization and applications of monoliths in analysis of biological samples.

30. 11. 2017

RNDr. Pavel Mikuška, CSc.

Atmospheric aerosols. Basic definitions and terms, effects of aerosols on environment and human health, physical properties, aerosol sources, size distribution and concentration measurements, chemical composition, specific types of aerosols (bioaerosols, nanoaerosols, indoor aerosols), aerosol concentrations in the Czech Republic.

The course will terminate on December 7, 2017 with an excursion to the labs of The Institute of Analytical Chemistry of the Czech Academy of Sciences.