



COURSE DATASHEET

Semester:	2014/15/2
Course:	Chemical analysis II.
Code:	VEMKKAB222V
Responsible department:	Department of Analytical Chemistry
Department code:	MKKA
Responsible instructor:	Dr. János Kristóf

Course objectives:

Getting familiar with the basics of instrumental analytical chemistry.

Course content:

1. Properties of electromagnetic radiation. Optical methods in analytical chemistry. Excitation of atoms and molecules. Absorption and emission processes. Qualitative and quantitative methods. 2. Atomic emission methods based on plasma sources. Instruments for plasma spectroscopy ICP-mass spectrometry. 3. Atomic absorption spectroscopy with flame and electrothermal atomization. Instrument for atomic absorption spectrometry. Special methods of quantitative measurements. 4. Molecular spectroscopy based in absorption and emission of light. Electronic, vibrational and rotational excitation of molecules. UV-VIS absorption and molecular fluorescence spectroscopy. 5. Vibrational spectroscopy. Infrared and near-infrared spectroscopy. Fourier-transform (FT) infrared (IR) spectroscopy. 6. Raman spectroscopy. Different mechanism of light scattering. Basic laser sources. FT-Raman spectroscopy and Raman microscopy. Multi-channel and CCD Raman detection. 7. Different methods of infrared and Raman spectroscopy and their analytical applications. Fibre-optic sampling. 8. Mass spectrometry. Instruments and operation of mass spectrometers. Qualitative and structural determination of compounds Quantitative mass spectrometry. 9. Spectroscopy of inner electrons. X-ray emission and absorption spectroscopy. Photoelectron spectroscopy, XPS, UPS techniques. Auger electron spectroscopy. 10. Analysis of surfaces electron and secondary ion mass spectrometry. 11-13. Chromatographic methods of separation. Migration ratios in chromatography, retention time, partition coefficients, selectivity and capacity. The efficiency of chromatographic column, column resolution. Different methods of chromatography gas chromatography and instrumentation. High-performance liquid chromatography and instrumentation. Ion chromatography. Basic principles of electro-chromatography. Basic applications. 14. Thermal analysis. Thermogravimetry, differential thermogravimetry, differential thermal analysis, differential scanning calorimetry. 15. Simultaneous techniques.

Requirements, evaluation and grading:

The topics of the lectures.

Required and recommended readings:



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Required and recommended readings:

D.A. Skoog and J.J. Leary: Principles of instrumental analysis, 4th edition, Saunders College Publishing, 1992