UNIVERSITY OF PANNONIA

SUBJECT DATASHEET

Semester:	2009/10/2
Subject:	Industrial monitoring
Code:	VEMKKA3255A
Responsible department:	Department of Analytical Chemistry
Responsible department code:	MKKA
Responsible lecturer:	dr. Tamás Pap

Educational objectives:

An understanding of the principles of modern industrial monitoring.

Detailed content of the subject:

1.Measurement of intensive physical property. Measurement of absorption of the electromagnetic radiation. Continuous determination of gas components (SO2 NO2 etc.) and light absorption compounds in solutions (for example: chloride in hydrochloric acid). Measurement of light scattering and turbidity of solutions. Analysis of smoke (Continuous determination of CO and CO2). Measurement of optical activity. Determination of oxygen content. 2.Measurement of intensive physical property related to chemical reactions. Potentiometric sensors. Spectrometric analysers for determination of components of the industrial water. Semi-conductor ion-selective electrodes, gaselectrods for high temperature. Termometric and piezoelectric quarz-crystal detectors. 3.Chemical analysers based on the chemical compensation and the measurement of the physical property. Automatic titrators. Continuous acid-base and redox titrations. Continuous determination of SO2 in air by coulometric method. 4.Two dimension analysers for multi elements determination. Nondestructive material testing. Measurement of colour. Calculation of composition of industrial paints. 5.Molecular spectroscopy. Infrared (IR) and near-infrared (NIR) monitoring of chemical processes (flow systems reaction mixtures and products). Introduction to the most important industrial monitoring systems based on IR and NIR spectroscopics. 6.Application of Raman spectroscopy. Introduction to simple monitoring systems based on fibre optic probe. 7.Application of vibrational spectroscopy in petrol chemistry. 8.Atomic spectroscopy. Determination of toxic metals from industrial origin. Characterization of monitoring techniques. 9.Process chromatography. Industrial separations. Comparison of analytical and preparative chromatography. Fundamentals of preparative chromatography. Theory and applications. 10.Counter-current chromatography, simulated moving bed chromatography. 11.Detectors on gas- and high performance liquid chromatography. Hyphenated techniques (HPLC-MS, GC-MS). Instrumentation and operational requirements. 12.Thermoanalytical and mass spectrometric methods: Application of thermal methods in process control and quality assurance of chemical industrial processes (DSC, TGA, TG-FT-IR, TG-MS). Description of the most important instrument configurations. 13.Mass spectrometric investigation of industrial catalysts, thin films and coatings. 14.Industrial radiometry (detectors and equipments for ionizing radiation, radiography, defectoscopy, computer tomography, control of radiation sources).Radiation monitoring in nuclear reactors. (Continuous controlling of safe operation, determination of dose rates, temperatures, etc., in situ ?-spectrometry, analysis the parameters determining reactor safety, indication of nuclear incidents are accidents.)

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Requirements:

The topics of the lectures.

Required and suggested references:

Inczédy János: Folyamatos és automatikus analízis. (Continuous and Automatic Analysis.) Műszaki Könyvkiadó, Budapest, 1984.