UNIVERSITY OF PANNONIA

COURSE DATASHEET

Semester:	2012/13/1
Course:	Laboratory Practice in Physical Chemistry
Code:	VEMKFK2132A
Responsible department:	Department of Physical Chemistry
Department code:	MKFK
Responsible instructor:	dr. András Dallos

Course objectives:

To make proficiency in experimental work and depending knowledge in physical chemistry by experiments

Course content:

1. Heat of neutralization. The heat of an acid-base reaction is determined in an adiabatic calorimeter by manual or PC controlled method. 2. Ratio of the heat capacities (Poisson constant) by Kundt's method. The velocity of sound in a gas is determined by the measurement of wave-length via resonance method. The Poisson constant is calculated from the measured data. 3. Vapor-liquid equilibrium in a binary mixture. The equilibrium compositions of the vapor and liquid phases are measured in a binary mixture at constant pressure. The molar fractions are determined by refractometry. 4. Vapor pressure of pure liquids. The vapor pressure of a pure liquid is measured as the function of temperature by isoteniscope method. The heat of vaporization is calculated using the Clausius-Clapeyron equation. 5. Thermal analysis. The composition of binary systems are determined by freezing point-composition diagrams. The freezing points of the mixtures are measured via cooling curves. 6. Conductivity of electrolyte solutions. Conductivities of a weak and a strong electrolyte are measured as a function of concentration. The dissociation constant of the weak electrolyte is calculated using the Ostwald's dilution law. 7. Inversion rate of sucrose. The rate constant of the acid-catalysed pseudo-first order reaction is determined. The reaction is followed by optical rotation measurement. 8. Rate of saponification of ethyl acetate. The second order reaction is followed by conductometry. The rate constant is calculated from the conductivity-time data. The activation energy is also calculated repeating the measurement at an other temperature. 9. Specific heat capacity of solids. The specific heat capacity of solid bodies are determined using the Newtonian law of cooling. 10. Partition of a solute between two immiscible liquids. The partition of acetic acid is investigated between two immiscible liquids (water and organic solvent). The equilibrium concentrations are determined by titration (water phase) or calculated using mass balance (organic phase). 11. Overpotential of hydrogen evolution. Tafel parameters of hydrogen evolution on Pt electrode are determined in acidic solutions via steady state polarization curves. 12. Galvanic corrosion. Evans-diagrams of galvanic corrosion systems are determined as function of pH by galvanostatic method. The maximum current density and potential of corrosion are determined via Evans diagrams. 13. Molar polarization and molar refraction. Molar polarization and refraction of liquids are determined by measuring the relative permittivity, refractive index and density. 14. Electrolysis. The decomposition voltage of an electrolyte is determined by electrolysis with indifferent electrodes, measuring and plotting the current intensity-voltage data. 15. Separation of dyes by chromatography. Two components of a dye mixture are separated via Al2O3 adsorption column using elution technique. The concentration of the separated dye solution is determined by

UNIVERSITY OF PANNONIA

COURSE DATASHEET

Semester:	2012/13/1
Course:	Laboratory Practice in Physical Chemistry
Code:	VEMKFK2132A
Responsible department:	Department of Physical Chemistry
Department code:	MKFK
Responsible instructor:	dr. András Dallos

Course content:

spectrophotometry. 16. Study of a redox electrode. The characteristic properties of a redox system are determined by measuring the e.m.f. of a suitable galvanic cell. 17. Determination of pH by different methods. The pH of solutions are determined via pH sensitive electrodes. (H2/Pt, quinhidrone, glass electrodes). 18. Determination of the thickness of an AgI layer. The thickness of a galvanic deposited AgI layer is determined by chronopotentiometry. 19. Concentration cells. Solubility product of sparingly soluble salts and mean activity coefficients of electrolyte solutions are determined by measuring the e.m.f. of suitable concentration cells.

Requirements, evaluation and grading:

The experiments have to be performed, the measurements and calculations have to be reported. The mark of the practice is based on the total points given for the measurements and the oral or written tests about the theoretical backgrounds. The conditions of the pass mark are the 50% of the attainable maximum points, and a satisfactory level of the tests in average.

Required and recommended readings:

1. Liszi, J.: Fizikai kémia, Veszprém, 1993. Kézirat. 2. Tanszéki munkaközösség: Fizikai kémiai laboratóriumi gyakorlatok, Veszprém, 2000. Kézirat.