UNIVERSITY OF PANNONIA

COURSE DATASHEET

Semester:	2016/17/1
Course:	Colloid Chemistry I.
Code:	VEMKFKB212B
Responsible department:	Department of Physical Chemistry
Department code:	MKFK
Responsible instructor:	dr. Tamás Kristóf

Course objectives:

Teach basic knowledge of colloid chemistry.

Course content:

Introduction. The colloid state, definition, thermodynamic stability. The brief history of colloid chemistry. Classification of colloidal systems. Interfacial phenomena. Nature of liquid surfaces. Surface tension of liquids. Change in vapour pressure for a curved surface. The equation of Young and Laplace. The spreading of one liquid on another. Capillarity. Surface tension of solutions. Orientation of molecules at interfaces. Gibbs monolayers. Association colloids. The properties of surfactants. Micelle formation and the shape of micelles. Factors determining the Critical Micellar Concentration. Solubilization. Liquid crystals. The solid-liquid interface. Wetting. Adsorption of non-eletrolytes, and electrolytes. Ion exchange. Electrical phenomena at interfaces. The theory of electrical double layer. The zeta potential. Electrophoresis. Electro-osmosis. Sedimentation potential. Streaming potential. Emulsions. Types and inversion of emulsions. Physical properties of emulsions. Factors determining emulsion stability. Homogeneous and heterogeneous nucleation. Classification of disperse systems. Preparation, stability, rupture. Aerodisperse systems. Liquid and solid aerosols. Fogs and smokes. Foams. Applications. Flotation of metallic minerals. Formation and stability of suspensions. Coagulation and flocculation. Sedimentation. Distribution of particles in polidisperse systems. Filtration. DLVO theory. Preparation of colloidal dispersions. Dispersion of bulk materials. Grinding. Colloid mills. Precipitation. Weimarn-rule. Dialysis and electro-dialysis. Classification and structure of porous bodies. Pore-systems. The SPV phase diagram. Gels. Gel-sol transitions. Coagulation and peptisation. Swelling. Ageing of gels. Thixotropy, syneresis. Macromolecular colloids. The types and structure of polymer molecules. Thermodynamic properties of polymer solutions. Determination of the shape and the mass distribution of polymer molecules. Plastics and composites. Rheology. Elastic deformation. Fluidity. Hook and Newton-law. Behaviour of non Newtonian liquids. Rheology of suspensions and polymer solutions.Viscoelasticity. Plasticity. The Bingham, the Kelvin and the Maxwell body. Complex models. Optical properties of colloidal systems. Scattering and absorption of light. Tyndall effect. Raleigh equation. Dispersity and colours. Summary, special questions.

Requirements, evaluation and grading:

Oral exam.

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Required and recommended readings:

Szántó Ferenc: A kolloidkémia alapjai. Gondolat, Budapest, 1987. Rohsetzer Sándor: Kolloidika. Tankönyvkiadó, Budapest, 1991. Juhász A. Zoltán: Általános szilikátkémiai kolloidika, I-III. Veszprém, Egyetemi jegyzet, 1998. Shaw, D. J.: Bevezetés a kolloid- és felületi kémiába, Műszaki Könyvkiadó, Budapest, 1986. Hunter, R. J.: Foundations of Colloid Science, I-II., Clarendon Press, Oxford, 1995.