



SUBJECT DATASHEET

Semester:	2010/11/2
Subject:	Silicate Chemistry
Code:	VEMKSI4213A
Responsible department:	Institute of Materials Engineering
Responsible department code:	MKSI
Responsible lecturer:	dr. Margit Eniszné Bódogh

Educational objectives:

Introduction to phase equilibrium of most important silicate systems. The structure of crystalline phases in raw materials and silicate products. Colloid chemical basis of the silicate technological processes

Detailed content of the subject:

Equilibrium phase diagrams-tools to study melting of solids, effect of fluxes (demonstrated by the kaolinite - CaCO_3 system); Melting behaviour as a function of chemical properties of components ($\text{Li}_2\text{O} - \text{SiO}_2$, $\text{Na}_2\text{O} - \text{SiO}_2$, $\text{K}_2\text{O} - \text{SiO}_2$ systems); Phase separation of melts (stable, metastable separation) ($\text{TiO}_2 - \text{SiO}_2$, $\text{BaO} - \text{SiO}_2$, $\text{CaO} - \text{SiO}_2$, $\text{MgO} - \text{SiO}_2$, $\text{PbO} - \text{SiO}_2$ systems), practical important of phase separation; Liquid phase sintering, explanation of processes of sintering of porcelain structure, disadvantages of eutectic melting and techniques to avoid this melting; Cooling diagrams and processes of some fundamentals systems, polymorphism, stabilization of phases, microstructures obtained by cooling various systems, solid solutions; Correlation between phase composition and physical properties as well as chemical composition and temperature: industrial products of the $\text{SiO}_2 - \text{Al}_2\text{O}_3$ system, binary and ternary compounds and industrial products of the $\text{CaO} - \text{SiO}_2 - \text{Al}_2\text{O}_3$ and $\text{MgO} - \text{SiO}_2 - \text{Al}_2\text{O}_3$ systems; Characterization of the structure of crystalline phases in raw materials and silicate products: structural chemistry of crystalline silicates, chemical bonds in silicates, classification of silicates (Liebau's, Strunz's, Kostov's and Zoltai's classifications); Structure and physical properties of neso-, soro-, cyclo-, ino- and phyllosilicates; Classification of clay minerals; Structure and physical properties of tectosilicates, modifications of SiO_2 at normal and high temperature, feldspars, zeolites; Colloid chemical basis of the silicate technological processes: Definition, classification, state parameters of disperse and diforme systems, review of natural disperse raw materials, powdery-porous systems; Appearance of surface phenomena in macroscopic properties of disperse systems, coagulation and agglomeration; Preparation of disperse systems by condensation and dispersion, mechanochemistry of solid materials, aggregation, dissolution and sedimentation equilibrium of disperse systems, water exclusion and powder filtering, peptisation of gels, sol-gel processes, syneresis; Capillary phenomena of disperse systems, wetting-through, convection of porous systems, reological properties of lysols, thixotropy, optical and electrical properties of disperse systems, applications, cleaning of liquids, production of organophile bentonite

Requirements:

Mandatory attendance of the lectures, the solution of a midterm test, grading is based on a written examination



SUBJECT DATASHEET

Semester: 2010/11/2
Subject: Silicate Chemistry
Code: VEMKSI4213A
Responsible department: Institute of Materials Engineering
Responsible department code: MKSI
Responsible lecturer: dr. Margit Eniszné Bódogh

Requirements:

Required and suggested references:

Tamás F.: Szilikátipari kézikönyv, Műszaki Könyvkiadó, Bp. 1982 Schatt, W., Worch, H.:
Werkstoffwissenschaften, Deutscher Verlag für Grundstoffindustrie, Stuttgart, 1996 Cahn, R. W. et. al.:
Materials Science and Technology, Vol.5. VCH Verlagsgesellschaft, Weinheim, 1991 Smith, W.F.:
Foundations of Materials Science and Engineering, Mc Graw-Hill, Inc., 1993 Flinn, R.A., Trojan, P.K.:
Engineering Materials, Houghton Mcfflin Company, 1990 Lee, W.E., Rainforth, W.M.: Ceramic
Microstructures Chapman & Hall, 1994 Hinz, W.: Silikate I, II. VEB Verlag für Bauwesen, Berlin, 1970
Nemecz E.: Agyagásványok, Akadémiai Kiadó, Budapest, 1973 Juhász A. Z.: Általános és szilikátkémiai
kolloidika I.-III Buzágh A.: Kolloidika I., II.