



SUBJECT DATASHEET

Semester:	2009/10/2
Subject:	Chemical Technologies III
Code:	VEMKTEV17XT
Responsible department:	Department of Hydrocarbon and Coal Processing
Responsible department code:	MKOL
Responsible lecturer:	Dr. Jenő Hancsók

Educational objectives:

1. To give a summary of the theoretical and practical knowledge on the catalysis. 2. Presentation of raw materials, properties, manufacturing of classical silicate products (ceramics, glasses, binding materials). 3. To give a short overview of principles of organic technologies. Selected industrial processes. The course is devoted to metallorganic catalysis. It covers the principals of homogeneous selective organic syntheses carried out by transition metal complexes and the industrial application of these catalysts 4. Acquirement of the basic aspects of the nuclear fuel-cycle, as well as of the production and applications of radioactive materials

Detailed content of the subject:

1. The role and importance of catalytic processes in hydrocarbon processing. History of industrial catalysis Classification of catalytic processes. Homogeneous and heterogeneous catalysis. Enzymatic catalysis. 2. Requirements of catalysts. Importance properties regarding their application: activity, selectivity, stability, morphological properties, mechanical stability, shape and size, thermal properties, cycle length, lifetime, production, cost 3. Catalysts of heterogeneous processes I 4. Catalysts of heterogeneous processes II. metal component(s) and role of promoters 5. Design and selection of catalysts. Ideal and optimal catalysts 6. Shape selective catalysis 7. Examples for catalyst manufacturing. Aspect of the selection of reactor types and configurations 8. Kinetics of catalysis I. 9. Kinetics of catalysis II. 10. Reactors and reactor systems for catalytic reactions 11. The operation of catalytic reactors: inspection before catalyst loading, activation procedures (drying, activation, sulphiding, etc.) for various catalysts, continuous control of the operation parameters of reactors, taking of catalyst samples during operation, etc. 12. Regeneration of catalysts (in situ and ex situ) 13. Preparation of catalysts for the reclamation of metal components. Catalyst unloading from reactors. Sources of danger, safety instructions 14. Recycling of the metal components of catalysts; Environmental issues of industrial catalysis

Requirements:

Examination paper. Examples of Examination Questions are in annex. (85%?5)

Required and suggested references:

1. Leach, B.E.: Applied Industrial Catalysis, Vol. 1-3. Academic Press, New York, 1983. 2. Le Page, J.-F. et al.: Applied Heterogenous Catalysis. Éditions Technip. Paris, 1987. 3. Meyers, R.A.: Handbook of Petroleum Refining Process, McGraw-Hill Book Company, New York, ..., Toronto, 1986. 4. Trimm, D.I. et al.: Catalysis



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in Petroleum Refining, 1989 Elsevier, Amsterdam, Tokyo, 1990. 5. Jones, T.C.: Diesel Plant Operations Handbook, McGraw-Hill Inc., N.Y., 1991. 6. Delannay, F.: Characterization of Heterogeneous Catalysts, Marcel Dekker, N.Y., 1984. 7. Szostak, R.: Molecular Sieves, Van Nostrand Reinhold, N.Y., 1989. 8. Moffat, J.B.: Theoretical Aspects of heterogenous Catalysis, Van Nostrand Reinhold, N.Y., 1990. 9. Chen, N.Y. et al.: Shape Selective Catalysis in Industrial Applications 2.edition, Marcel Dekker Inc., N.Y. Basel Hong Kong, 1996. 10. Satterfield, C.N.: Heterogenous Catalysis in Industrial Practice, McGraw-Hill Inc., N.Y., 1991. 11. Rase, H.F.: Fixed Bed Reactor Design and Diagnostics, Butterworths, Boston, 1990. 12. Stiles, A.B. és Koch, T.A.: Catalyst manufacture 2. kiadás, Marcel Dekker Inc., N.Y. Basel Hong Kong, 1995. 13. Masel, R.I.: Chemical kinetics and catalysis, John Wiley and Sons, Inc., 2001. 14. Becker, E.R. és Pereira, C.J.: Computer-aided design of catalysts, Marcel Dekker Inc., N.Y. Basel Hong Kong, 1993. Laboratóriumi gyakorlatokhoz: Gary, J.H.: Petroleum Refining Technology and Economics 3rd, Marcel Dekker, N.Y. 1999. Speight, J.G.: The chemistry and technology of petroleum 3rd. Marcell Dekker, 1998. Speight, J.G.: Petroleum Chemistry and Refining, Taylor and Francis 1998. Sequeira, A.: Lubricant base oil and wax processing, Marcell Dekker, 1994. Weissermel, K., Arpe, H.-J.: Ipari szerves kémia, Nemzeti Tankönyvkiadó, Budapest, 1993. Mc Ketta, J.: Petroleum Processing Handbook, Marcell Dekker, 1992. Hobson, G.D.: Modern Petroleum Technology, J. Wiley, 1986. Chauvel, A., Lefebvre, G.: Petrochemical processes I-II., 1989. Fahey, D.R.: Industrial Chemicals via C1 Processes, A.C.S., 1986. Wiseman, P.: Petrochemicals, John Wiley, N.Y., 1986. Meyers, R.A.: Handbook of petroleum Refining Processes, McGraw-Hill Inc., N.Y., Toronto, 1996. Chauvel, A., Lefebvre, G.: Petrochemical processes I-II. Gulf. 1989. Krevelen, D.W. Van.: Properties of polymers, Elsevier, Amsterdam, ..., Tokyo, 1990. Fourné, F.: Synthetic Fibers, Hanser Publishers, Munich 1999. Gunardson, H.: Industrial Gases in Petrochemical processing, Marcel Dekker Inc., 1998. Scheirs, J., Kaminsky, W.: Metallocen based Polyolefins, preparation, properties and technology Vol.1, John Wiley and Sons, Ltd., 2000. Olah, G.A., Molnár, Á.: Hydrocarbon chemistry, John Wiley and Sons, Inc., 1995. Hancsók Jenő: Korszerű motor és sugárhajtómű üzemanyagok, Tankönyvek, I. Motorbenzinek (1997), II. Dízelgázolajok (1999), Alternatív motorhajtóanyagok (2004).