



SUBJECT DATASHEET

Semester:	2009/10/2
Subject:	Industrial catalysis
Code:	VEMKTE3212A
Responsible department:	Department of Hydrocarbon and Coal Processing
Responsible department code:	MKOL
Responsible lecturer:	Dr. Jenő Hancsók

Educational objectives:

Combination of theoretical and practical chemical engineering knowledge on the area of catalysis.

Detailed content of the subject:

1. The place and role of the industrial catalysis in the hydrocarbon processing industry. Historical review of industrial catalysis. Classification of catalytic processes. Homogeneous and heterogeneous catalysis. Enzymatic catalysis. 2. Requirements of catalysts, properties for applicability: activity, selectivity, stability, morphological properties, mechanical stability, shape and size, thermal stability, period of activity, lifetime, reproducible production, cost. 3. Classification, design and selection of catalysts. Ideal and optimal catalysts. 4. Catalysts for homogeneous application. 5. Heterogeneous catalysts I. 6. Heterogeneous catalysts II., role of metal components and promoters. 7. Shape selective catalysts. 8. Examples for catalysts production. 9. Basic knowledge of kinetics. 10. Survey of catalytic systems and reactor systems. Aspects of selection of reactors and reactor arrangements. 11. Operation of catalytic reactors: checking process before catalyst loading, start-up of different type of catalysts (drying, pre-treatment etc.), continuous checking of process parameters, catalyst sample taking during the operation etc. 12. Regeneration of catalyst ("in situ" and "ex situ"). 13. Preparation of catalysts for metal content recovery, unloading of reactors, hazards, safety procedures. 14. Recovery and recycling of metal components of catalysts. 15. Catalytic processes of the hydrocarbon industry and the environmental protection.

Requirements:

The method of scoring is written examination. Minimum requirement is 50%. For the score of 5 higher than 85% is required.

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 in Petroleum Refining, 1989 Elsevier, Amsterdam, Tokyo, 1990. 5. Jones, T.C.: Diesel Plant Operations



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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 heterogeneous 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.: Heterogeneous 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.