

Case studies in Industrial Catalysis (KDIT121)

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Oil Hydrogenation Processes and related Catalysts, Catalyst deactivation; Catalysts for: HDS, Reforming, Isomerization, FCC. Case study I: Deactivation of an Industrial Hydrotreating catalyst, Case study II: Efficiency of a Commercial HDS catalyst

Advanced Catalysts for Conversion of Biologically Derived Feedstocks. Biofuels, a part of Solution of the Global Warming Problem - Potentials, Routes, Catalysts, Case study I: Transesterification by heterogeneous catalysts, Case study II: Kinetics of heterogeneous transesterification

Process Intensification by Chemical Looping, Chemical Looping Combustion, Reforming and Sorption enhanced Reforming, Case study: Activity of NiO/support catalysts as oxygen transfer materials in Steam Methane Reforming

Prediction of Activity of Industrial catalyst during its Lifetime, Catalyst Deactivation Kinetics, Case study: Activity prediction of a Commercial catalyst by Accelerated Deactivation

Zeolites – remarkable Catalysts. Zeolites - Structure, Acidity, Physical & Chem. Properties, Shape Selectivity, Mass transfer Phenomena, Insights into Zeolite Catalysis

Recommended reading

G. Boskovic, M. Baerns: Catalyst Deactivation, in M. Baerns (editor): Basic Principles of Applied Catalysis, Springer-Verlag, 475-503, Berlin 2004, ISBN: 3-540-44135-2

C.H. Bartholomew, R.J. Farrauto: Fundamentals of Industrial Catalytic Processes, Chap. 9, J. Wiley&Sons, Inc., Hoboken 2006, ISBN-13: 978-0471457138

R. Marinković-Nedučin et al., Deactivation of industrial hydrotreating catalyst for middle petroleum fraction processing, Appl. Catal., 107, 2 (1994) 133-145

R. Micic et al., A Pilot-Plant Simulation of the Influence of the H₂/H₂S ratio on the Efficiency of a Commercial HDS Plant, Ind.&Eng. Chem. Res., 45, 22 (2006) 7393-7398

Basic research needs: Catalysis for Energy, Report from the U.S. DOE, Office of Basic Energy Sciences Workshop, August 6-8, 2007, p.55-67, 135-149, Bethesda, Maryland, PNNL-17214

F. Kiss et al., Economic and ecological aspects of biodiesel production over homogeneous and heterogeneous catalysts, Fuel Process. Technol. 91 (2010) 1316-1320

Dj. Vujicic et al., Kinetics of biodiesel synthesis from sunflower oil over CaO heterogeneous catalyst, Fuel 89 (2010) 2054-2061

V.B. Veljkovic et al., Kinetics of sunflower oil methanolysis catalyzed by CaO, Fuel 88 (2009) 1554-1562

J. Adanez et al., Progress in Chemical-Looping Combustion and Reforming technologies, Prog. Energy & Comb. Sci. 38 (2012) 215-282

C.S. Martavaltzi et al., Hydrogen Production via Steam Reforming of Methane with Simultaneous CO₂ Capture over CaO-Ca₁₂Al₁₄O₃₃, Energy Fuels 24 (2010) 2589-2595

L. Silvester et al., Characterization of NiO-based OTM for sorption enhanced chemical looping SMR, Proceedings of the 13th International Conference on Clean Energy, Istanbul 2014, p. 1252-1257. ISBN: 978-605-64806-0-7

L. Silvester et al., NiO supported on Al₂O₃ and ZrO₂ oxygen carriers for chemical looping SMR, Intern. J. Hydro. Energy 40, 24 (2015) 7490-7501. O. Levenspiel, s, J.Catal., 25 (1972) 265-272

O. Levenspiel: Omnibook, Corvallis, Oregon 1984. ISBN 0882460676 9780882460673

G. Boskovic et al., Deactivation of a commercial catalyst in the epoxidation of ethylene to ethylene oxide—basis for accelerated testing, *J. Catal.*, 224 (2004) 187–196

G. Boskovic et al., Deactivation kinetics of Ag/Al₂O₃ catalyst for ethylene epoxidation, *J. Catal.*, 226 (2004) 334–342

D.W. Breck: Zeolite Molecular Sieves, John Wiley&Sons, New York 1974

N.Y. Chen et al.: Shape Selective Catalysis in Industrial Applications, Marcel Dekker, Inc., New York 1989

H.V. Bakkum et al. (Editors), *Stud. Surf. Sci. Catal.*, 58, Introduction to Zeolite Science and Practice, Elsevier, Amsterdam 1991

C.S. John et al., New Insight into Zeolite Catalysis in J.M. Thomas, K.I. Zamaraev (Editors): *Perspective in Catalysis*, Blackwell Sci. Publ., Oxford 1992

G. Boskovic et al., Acid Sites in HZSM-5 upon Copper Exchange by FTIR and DSC using Ammonia, *Chem. Eng. & Technol.* 3 (2001) 269-274

G. Boskovic et al., n-hexane isomerization over Pt-Na(H)Y catalysts obtained by different preparation method, *Catal. Today* 65 (2001) 123-128