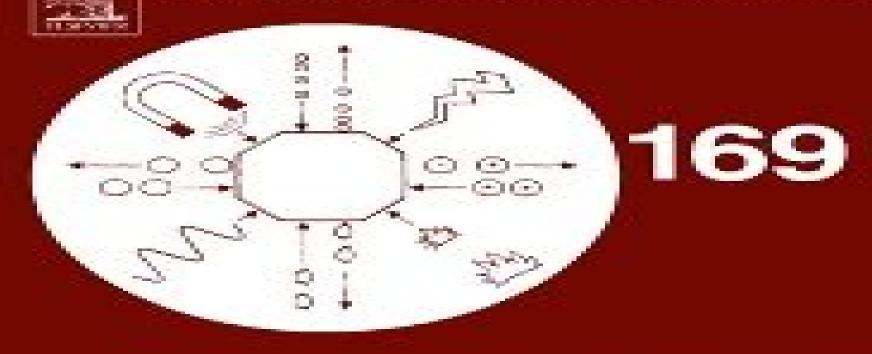
studies in surface science and catalysis



# CATALYSTS FOR UPGRADING HEAVY PETROLEUM FEEDS



# **Catalysts For Upgrading Heavy Petroleum Feeds Volume 169**

**Arno de Klerk, Edward Furimsky** 

#### **Catalysts For Upgrading Heavy Petroleum Feeds Volume 169:**

Catalysts for Upgrading Heavy Petroleum Feeds Edward Furimsky, 2007-09-12 The book provides the most up to date information on testing and development of hydroprocessing catalysts with the aim to improve performance of the conventional and modified catalysts as well as to develop novel catalytic formulations Besides diverse chemical composition special attention is devoted to pore size and pore volume distribution of the catalysts Properties of the catalysts are discussed in terms of their suitability for upgrading heavy feeds For this purpose atmospheric residue was chosen as the base for defining other heavy feeds which comprise vacuum gas oil deasphalted oil and vacuum residues in addition to topped heavy crude and bitumen Attention is paid to deactivation with the aim to extent catalyst life during the operation Into consideration is taken the loss of activity due to fouling metal deposition coke formed as the result of chemical reaction and poisoning by nitrogen bases Mathematical models were reviewed focussing on those which can simulate performance of the commercial operations Configurations of hydroprocessing reactors were compared in terms of their capability to upgrade various heavy feeds providing that a suitable catalyst was selected Strategies for regeneration utilization and disposal of spent hydroprocessing catalysts were evaluated Potential of the non conventional hydroprocessing involving soluble dispersed catalysts and biocatalysts in comparison with conventional methods were assessed to identify issues which prevent commercial utilization of the former A separate chapter is devoted to catalytic dewaxing because the structure of dewaxing catalysts is rather different than that of hydroprocessing catalysts i e the objective of catalytic dewaxing is different than that of the conventional hydroprocessing The relevant information in the scientific literature is complemented with the Patent literature covering the development of catalysts and novel reactor configurations Separate chapter was added to distinguish upgrading capabilities of the residues catalytic cracking processes from those employing hydroprocessing Upper limits on the content of carbon residue and metals in the feeds which can still be upgraded by the former processes differ markedly from those in the feeds which can be upgraded by hydroprocessing It is necessary that the costs of modifications of catalytic cracking processes to accommodate heavier feeds are compared with that of hydroprocessing methods Objective of the short chapter on upgrading by carbon rejecting processes was to identify limits of contaminants in heavy feeds beyond which catalytic upgrading via hydroprocessing becomes uneconomical because of the costs of catalyst inventory and that of reactors and equipment Comprehensive and most recent information on hydroprocessing catalysts for upgrading heavy petroleum feeds Compares conventional modified and novel catalysts for upgrading a wide range of heavy petroleum feeds Comparison of conventional with non conventional hydroprocessing the latter involving soluble dispersed catalysts and biocatalysts Development and comparison of mathematical models to simulate performance of catalytic reactors including most problematic feeds Residues upgrading by catalytic cracking in comparison to hydroprocessing Catalysts for Upgrading Heavy Petroleum Feeds; Studies in Surface Science and Catalysis Furimsky E., 2007 **Zeolites and Related** 

Materials: Trends Targets and Challenges(SET) Antoine Gedeon, Pascale Massiani, Florence Babonneau, 2008-08-19 The present book Zeolites and Related Materials Trends Targets and Challenges reports the communications that have been presented at the 4th International FEZA Federation of European Zeolite Associations Conference in Paris September 3 6 2008 It gives an excellent overview of the present state of the art of ordered nanoporous solids including zeolites as well as synthetic layered materials clays nanosized molecular sieves ordered mesoporous solids metal organic framework compounds MOFs carbons etc with emphasis on the synthesis comprehensive characterization and advanced applications The significant research activities in this domain are due to the outstanding properties of those nanoporous materials that concentrate the collaborative efforts of researchers from material science chemistry physical chemistry and physics The understanding and development of the unique properties of porous materials relies on a unique blend of multidisciplinary knowledge covering material science with the implication of organic and colloid chemistry to prepare micro and mesoporous materials surface and adsorption sciences sustained by theory and modelling to understand the peculiar behaviour of molecules in confined systems special branches of catalysis physics chemical engineering and life science to design novel applications This book summarizes the developments in the area of nanoporous solids at the dawn of the 21st century useful for both students young researchers entering the field of nanoporous materials as well as for senior scientists Also summarizes the new family of porous compounds e q MOF s and ordered porous carbon The present state of the art and prospects of nanoporous solids for advanced applications is discussed 
Past and Present in DeNOx Catalysis: From Molecular Modelling to Chemical Engineering Pascal Granger, Vasile Pârvulescu, 2007-12-15 This book offers an overview of the state of the art in the field of DeNOx catalysis in order to focus novel orientations new technological developments from laboratory to industrial scale A particular attention has been paid towards the implementation of catalytic processes for minimising NOx emissions either from stationary or mobile sources under lean condition to meet future standard regulations of NOx emissions In the first part of this book critical aspects reported in the literature which usually make difficult the achievement of efficient catalytic technologies in those conditions are summarised and analysed in order two separate new perspectives The second part deals with fundamental aspects at molecular level A better understanding of the reactions involved under unsteady state conditions is probably a pre requisite step for improving the performances of the actual processes or developing original ones The development of powerful in situ spectroscopic techniques is of fundamental interest for kinetic modelling Correlations between spectroscopic and kinetic data with those obtained from theoretical calculations are reported Some illustrations emphasise the fact that these comparisons may help in determining the nature of the catalytic active sites and building predictive tools for simulations under running conditions. The latter part of this book will be illustrated by different practical approaches covering various aspects related to the catalysts preparation and the development of alternative technologies which include industrial considerations New technological developments for

investigating catalytic reactions in transient conditions in situ and operando spectroscopic techniques Concerted approaches in DeNOx catalysis How academic aspects kinetic in situ spectroscopic measurements can provide useful information for practical applications Comparison of different approaches provided by academic and industrial partners *From Zeolites to Porous MOF Materials - the 40th Anniversary of International Zeolite Conference, 2 Vol Set* Ruren Xu, Jiesheng Chen, Zi Gao, Wenfu Yan, 2007-07-12 The Proceedings of the 15th International Zeolite Conference contain 291 full papers including the full papers of 5 plenary lecture 12 keynote lectures and 4 invited lectures at the R M Barrer Symposium The topics of these full papers include synthesis modifications structures characterization adsorption separation and diffusion catalysis host guest chemistry and advanced materials industrial applications theory and modeling mesostructured materials MOF materials and natural zeolites The other 271 full papers were selected from the about 1000 contributions submitted to the 15th IZC Most recent research results in zeolite science Full indexes Wide coverage of zeolite science and technology

Science and Technology in Catalysis K Eguchi, M Machida, I Yamanaka, 2007-11-27 Unsteady state operations of catalytic reactors provide plentiful opportunities for research and commercial realization of efficient heterogeneous catalytic processes Forced unsteady state conditions generate unique distributions of process parameters and catalyst states often unattainable with traditional steady state operation. The unsteady states can be created by periodic changes in input flow parameters such as changes in inlet temperature and composition catalyst circulation through reaction and regeneration zones or periodic flow reversals through fixed catalyst bed. This can result in increased productivity selectivity capital savings and operating cost reduction higher energy efficiency Efficient environmental technologies for treatment of toxic emissions acid rain and greenhouse gas emissions can also be developed using the unsteady state concept. The Proceedings communicate recent progress in these areas of research and promote future development. The aims are to establish relations between academia industry engineers and scientists from all over the world to stimulate new catalytic technologies as well as fundamental research and to create new concepts for the development of effective catalytic systems. It presents the most up to date research in catalysis contains the most recent developments in catalytic research includes research finding as well as their application to industry a thorough source of information on the latest developments of industrial catalysis in Japan

Biotechnology for Treatment of Residual Wastes Containing Metals Norma Gabriela Rojas-Avelizapa, 2022-09-01
Biotechnology for Treatment of Wastes Containing Metals addresses various aspects related to different wastes that have a metallic content and represent a serious risk for the environment and human health These wastes due to their physical and chemical characteristics have been the object of studies which have led to the development of different technologies in recycling reuse or adequate disposal biotechnology being one of these alternatives Biotechnology offers a range of options for the treatment of types of waste using microorganisms biomass and their by products The mechanisms involved in these waste treatment processes are diverse and complex and its optimization and efficiency is multifactorial This text contains

nine chapters related to the problem of the metal contamination in the environment as well as some of the different biotechnological alternatives that have been applied for the reduction and or recovery of metal contamination Handbook of Petroleum Refining Processes, Fourth Edition Robert A. Meyers, 2016-03-18 This fully revised resource presents the latest technologies and processes for petroleum refining from the world's leading producers Handbook of Petroleum Refining Processes has become a key reference in the chemical and petroleum engineering markets. The book is unique in that it presents licensable technologies for the refining of petroleum and production of environmentally acceptable fuels and petrochemical intermediates The new edition covers the gamut of global refining technologies in light of recent changes to the sources of these fuels as well as the most up to date global environmental regulations Contributions come from such major licensors of petroleum refining technology as UOP Inc Shell ExxonMobil Research and Engineering Company EMRE Chevron Lummus Global Phillips 66 Belco BP and others The new edition shifts its emphasis to accommodate the increased production of shale gas and shale oil which is changing the overall mix of hydrocarbon feeds Declining conventional crude production and the need for regional energy independence continues to drive demand to use lower cost alternate feedstocks such as coal shale oil and heavy crude To use alternate feedstocks in existing refineries many processes need to be modified The increase in diesel demand and stricter fuel specifications is driving refiners to look for ways to produce higher yields from existing assets The book reflects these factors plus the increase in residue conversion hydrocracking evolving as a primary conversion process and hydrotreating increasing as a way to treat virgin and cracked middle distillate streams Offers detailed description of process chemistry and thermodynamics and product by product specifications of plants Contributors are drawn from the largest petroleum producers in the world including Chevron Shell ExxonMobil and UOP Covers the very latest technologies in the field of petroleum refining processes and the shift toward shale gas and oil A complete listing and explanation of licensable global technologies for the refining of petroleum and the production of environmentally acceptable fuels and petrochemical intermediates Provides product by product specifications and process economics capital investment annualized capital costs and the price range for each product *Catalysis* in the Refining of Fischer-Tropsch Syncrude Arno de Klerk, Edward Furimsky, 2010 Fischer Tropsch Synthesis FTS has been used on a commercial scale for more than eighty years It was initially developed for strategic reasons because it offered a source of transportation fuels that was independent from crude oil Unlike crude Fischer Tropsch synthetic crude is rich in olefins and oxygenates while being sulphur and nitrogen free Consequently the catalysis involved in refining it is significantly different and only a few catalysts have been developed for the purpose Until now an account of this topic has been missing from the literature despite mounting interest in the technology This is the first book to provide a review and analysis of the literature journal and patent on the catalysis needed to refine syncrude to transportation fuels It specifically highlights the impact of oxygenates and how oxygenates affect selectivity and deactivation This aspect is also related to the refining of biomass

derived liquids Topics covered include dimerisation oligomerisation isomerisation hydroisomerisation catalytic cracking hydrocracking and hydrogenation catalytic reforming aromatic alkylation etherification dehydration and some oxygenate and wax specific conversions 
Upgrading Petroleum Residues and Heavy Oils R. Murray Gray,1994-04-19 This useful reference offers in depth coverage of current techniques for converting heavy oils and residues into more valuable distillates Examines the chemistry of heavy hydrocarbon feeds and their properties important to engineering design including phase behavior reaction kinetics and thermodynamic and transport characteristics

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