Heavy Oils Production And Upgrading From Geology To Upgrading An Overview Ifp Publications

Pamphlets and booklets advertising products and recipes from companies such as Kellogg Company, Jell-O, Heinz, and General Baking Company.
Unconventional reservoirs of oil and gas represent a huge additional global source of fossil fuels. However, there is much still to be done to improve techniques for their processing to make recovery

and refining of these particular energy sources more cost-effective. Brief but readable, Heavy and Extra-heavy Oil Upgrading Technologies provide readers with a strategy for future production (the up-stream) and upgrading (the down-stream). The book provides the reader with an understandable overview of the chemistry and engineering behind the latest developments and technologies in the industry as well as the various environmental regulations. Clear and rigorous, Heavy and Extra-heavy Oil Upgrading Technologies will prove tool for those scientists and engineers already engaged in fossil fuel science and technology

as well as scientists, non-scientists, engineers, and non-engineers who wish to gain a general overview or update of the science and technology of unconventional fossil fuels in general and upgrading technologies in particular. The use of microorganisms and a number of physical methods, such as ultrasound, median microwave, cold plasma, electrokinetic and monocrystalline intermetallics, etc., will be discussed for the first time. Overview of the chemistry, engineering, and technology of oil sands Microorganisms and a number of physical methods such as ultrasound, median microwave, cold plasma, electrokinetic and

monocrystalline intermetallics
Evolving and new environmental regulations regarding oil sands production processes
Recent oil price fluctuations continue to stress the need for more efficient recovery of heavy oil and tar sand bitumen resources. With conventional production steadily declining, advances in enhanced recovery will be required so that oil production can be extended and reservoirs last longer. A practical guide on heavy-oil related recovery methods is essential for all involved in heavy oil production. To feed this demand, James Speight, a well-respected scientist and author, provides a must-read for all

scientists, engineers and technologists that are involved in production enhancement. In Enhanced Recovery Methods for Heavy Oil and Tar Sands, Speight provides the current methods of recovery for heavy oil and tar sand bitumen technology, broken down by thermal and non-thermal methods. An engineer, graduate student or professional working with heavy oil, upcoming and current, will greatly benefit from this much-needed text.

"The emphasis throughout is to link the fundamentals of the molecules through to the economic drivers for the industry, because this combination determines the

technology used for processing."-From the Introduction The high demand for quality petroleum products necessitates ongoing innovation in the science and engineering underlying oilsands extraction and upgrading. Beginning with a thorough grounding in the composition, fluid properties, reaction behaviour, and economics of bitumen and heavy oil, Murray Gray then delves into current processing technologies, particularly those used at full commercial scale. The tables of data on composition, yield, and behaviour of oilsands bitumen and heavy oil fractions are extensive.

Though the focus is on bitumen from Alberta's oilsands-the largest resource in the world-the science applies to upgrading of heavy oil and petroleum residue feeds worldwide. Upgrading Oilsands Bitumen and Heavy Oil lays out the current best practice for engineers and scientists in the oilsands and refining industries, government personnel, academics, and students.

Petroleum and Gas Field Processing

Heavy Crude Oils

Energy Research Abstracts

Nanotechnology for Energy and Environmental Engineering

"Second Edition expands and updates

information on the technological aspects of refining heavy oils, residua, bitumen, and other high-sulfur feedstocks. Focuses on the range of next-generation refining processes." Work completed under this program advances the goal of demonstrating Western Research Institute's (WRI's) WRITE{trademark} process for upgrading heavy oil at field scale. MEG Energy Corporation (MEG) located in Calgary, Alberta, Canada supported efforts at WRI to develop the WRITE{trademark} process as an oil sands, field-upgrading technology through this Task 51 Jointly Sponsored Research project. The project consisted of 6 tasks: (1) optimization of the distillate recovery unit (DRU), (2) demonstration and design of a continuous coker, (3) conceptual design and cost estimate

for a commercial facility, (4) design of a WRITE{trademark} pilot plant, (5) hydrotreating studies, and (6) establish a petroleum analysis laboratory. WRITE{trademark} is a heavy oil and bitumen upgrading process that produces residuum-free, pipeline ready oil from heavy material with undiluted density and viscosity that exceed prevailing pipeline specifications. WRITE{trademark} uses two processing stages to achieve low and high temperature conversion of heavy oil or bitumen. The first stage DRU operates at mild thermal cracking conditions, yielding a light overhead product and a heavy residuum or bottoms material. These bottoms flow to the second stage continuous coker that operates at severe pyrolysis conditions, yielding light pyrolyzate and coke. The combined pyrolyzate

and mildly cracked overhead streams form WRITE{trademark}'s synthetic crude oil (SCO) production. The main objectives of this project were to (1) complete testing and analysis at bench scale with the DRU and continuous coker reactors and provide results to MEG for process evaluation and scale-up determinations and (2) complete a technical and economic assessment of WRITE{trademark} technology to determine its viability. The DRU test program was completed and a processing envelope developed. These results were used for process assessment and for scaleup. Tests in the continuous coker were intended to determine the throughput capability of the coker so a scaled design could be developed that maximized feed rate for a given size of reactor. These tests were only partially successful because

of equipment problems. A redesigned coker, which addressed the problems, has been build but not operated. A preliminary economic analysis conducted by MEG and an their engineering consultant concluded that the WRITE{trademark} process is a technically feasible method for upgrading bitumen and that it produces SCO that meets pipeline specifications for density. When compared to delayed coking, the industry benchmark for thermal upgrading of bitumen, WRITE{trademark} produced more SCO, less coke, less CO2 per barrel of bitumen fed, and had lower capital and operating costs. On the other hand, WRITE{trademark}'s lower processing severity yielded crude with higher density and a different product distribution for naphtha, light gas oil

and vacuum oil that, taken together, might reduce the value of the SCO. These issues plus the completion of more detailed process evaluation and economics need to be resolved before WRITE{trademark} is deployed as a field-scale pilot.

Introduction to Enhanced Recovery Methods for Heavy Oil and Tar Sands, Second Edition, explores the importance of enhanced oil recovery (EOR) and how it has grown in recent years thanks to the increased need to locate unconventional resources such as heavy oil and shale. Unfortunately, petroleum engineers and managers aren't always well-versed in the enhancement methods that are available when needed or the most economically viable solution to maximize their reservoir's productivity. This revised new edition presents all

the current methods of recovery available, including the pros and cons of each. Expanded and updated as a great preliminary text for the newcomer to the industry or subject matter, this must-have EOR guide teaches all the basics needed, including all thermal and non-thermal methods, along with discussions of viscosity, sampling, and the technologies surrounding offshore applications. Enables users to quickly learn how to choose the most efficient recovery method for their reservoir while evaluating economic conditions Presents the differences between each method of recovery with newly added real-world case studies from around the world Helps readers stay competitive with the growing need of extracting unconventional resources with new content on how these

complex reservoirs interact with injected reservoir fluids

This book examines the potential applications of nanoscience and nanotechnology to promote eco-friendly processes and techniques for energy and environment sustainability. Covering various aspects of both the synthesis and applications of nanoparticles and nanofluids for energy and environmental engineering, its goal is to promote eco-friendly processes and techniques. Accordingly, the book elaborates on the development of reliable, economical, eco-friendly processes through advanced nanoscience and technological research and innovations. Gathering contributions by researchers actively engaged in various domains of nanoscience and technology, it addresses topics such

as nanoparticle synthesis (both top-down and bottom-up approaches); applications of nanomaterials, nanosensors and plasma discharge in pollution control; environmental monitoring; agriculture; energy recovery; production enhancement; energy conservation and storage; surface modification of materials for energy storage; fuel cells; pollution mitigation; and CO2 capture and sequestration. Given its scope, the book will be of interest to academics and researchers whose work involves nanotechnology or nanomaterials, especially as applied to energy and/or environmental sustainability engineering. Graduate students in the same areas will also find it a valuable resource.

Department of Energy Authorization for Fiscal Years 1982, 1983, and 1984

Practical Advances in Petroleum Processing

Heavy and Extra-heavy Oil Upgrading Technologies

Chemical Transformation during Hydroprocessing of Heavy Oils

Advertising Pamphlets and Booklets Collection

During the upgrading of heavy petroleum, asphaltene is the most problematic impurity since it is the main cause of catalyst deactivation and sediments formation. Exploring many aspects related to asphaltenes composition and conversion, Asphaltenes: Chemical Transformation during Hydroprocessing of

Heavy Oils highlights the various changes that these heavy and complex molecules undergo during catalytic hydroprocessing. After defining and characterizing asphaltene structure, the book examines the composition of petroleum and the processes and catalysts for upgrading heavy oils. It then details the characterization of asphaltenes after hydroprocessing and the effect of reaction conditions on their structures. The authors also analyze the deactivation and

characterization of spent hydroprocessing catalysts as well as the role played by asphaltenes. They cover sediments formation during hydroprocessing and the role of asphaltenes on it. The final chapters describe the hydrocracking and kinetics of asphaltenes and the fractionation of heavy crudes and asphaltenes. Due to the increasing production of heavy crude oils, asphaltene has become one of the most studied molecules. This book provides a deep understanding of how asphaltenes transform

during hydroprocessing, offering insight on designing catalysts and processing for the upgrading of heavy oils. Introduction to Petroleum Biotechnology introduces the petroleum engineer to biotechnology, bringing together the various biotechnology methods that are applied to recovery, refining and remediation in the uses of petroleum and petroleum products. A significant amount of petroleum is undiscoverable in reservoirs today using conventional and secondary methods. This reference

explains how microbial enhanced oil recovery is aiding to produce more economical and environmentally-friendly metabolic events that lead to improved oil recovery. Meanwhile, in the downstream side of the industry, petroleum refining operators are facing the highest levels of environmental regulations while struggling to process more of the heavier crude oils since conventional physical and chemical refining techniques may not be applicable to heavier crudes. This reference

proposes to the engineer and refining manager the concepts of bio-refining applications to not only render heavier crudes as lighter crudes through microbial degradation, but also through biodenitrogenation, biodemetallization and biodesulfurization, making more petroleum derivatives purified and upgraded without the release of more pollutants. Equipped for both upstream and downstream to learn the basics, this book is a necessary primer for today's petroleum engineer.

Presents the fundamentals behind petroleum biotechnology for both upstream and downstream oil and gas operations Provides the latest technology in reservoir recovery using microbial enhanced oil recovery methods Helps readers gain insight into the current and future application of using biotechnology as a refining and fuel blending method for heavy oil and tar sands Heavy Crude OilsFrom Geology to Upgrading : an OverviewEditions TECHNIP The worldwide petroleum industry is facing a

dilemma: the production level of heavy petroleum is higher than that of light petroleum. Heavy crude oils possess high amounts of impurities (sulfur, nitrogen, metals, and asphaltenes), as well as a high yield of residue with consequent low production of valuable distillates (gasoline and diesel). These characteristics, in turn, are responsible for the low price of heavy petroleum. Additionally, existing refineries are designed to process light crude oil, and heavy oil cannot be refined to 100 percent. One

solution to this problem is the installation of plants for heavy oil upgrading before sending this raw material to a refinery. Modeling of Processes and Reactors for Upgrading of Heavy Petroleum gives an up-to-date treatment of modeling of reactors employed in the main processes for heavy petroleum upgrading. The book includes fundamental aspects such as thermodynamics, reaction kinetics, chemistry, and process variables. Process schemes for each process are discussed in detail. The author thoroughly

describes the development of correlations, reactor models, and kinetic models with the aid of experimental data collected from different reaction scales. The validation of modeling results is performed by comparison with experimental and commercial data taken from the literature or generated in various laboratory scale reactors. Organized into three sections, this book deals with general aspects of properties and upgrading of heavy oils, describes the modeling of non-catalytic

processes, as well as the modeling of catalytic processes. Each chapter provides detailed experimental data, explanations of how to determine model parameters, and comparisons with reactor model predictions for different situations, so that readers can adapt their own computer programs. The book includes rigorous treatment of the different topics as well as the step-by-step description of model formulation and application. It is not only an indispensable reference for

professionals working in the development of reactor models for the petroleum industry, but also a textbook for full courses in chemical reaction engineering. The author would like to express his sincere appreciation to the Marcos Moshinsky Foundation for the financial support provided by means of a Cátedra de Investigación.

A Case for Partial Upgrading

Upgrading Petroleum Residues and Heavy Oils

Introduction to Enhanced Recovery Methods for

Heavy Oil and Tar Sands
Heavy Oil Recovery and Upgrading
Heavy Oil & Tar Sands : Producing, Upgrading & Economics

A method that combines the oil retorting process (or other process needed to obtain/extract heavy oil or bitumen) with the process for upgrading these materials using sodium or other alkali metals. Specifically, the shale gas or other gases that are obtained from the retorting/extraction process may be introduced into the upgrading reactor and used to upgrade the oil feedstock. Also, the solid materials obtained from the reactor may be used as a fuel source, thereby

providing the heat necessary for the retorting/extraction process. Other forms of integration are also disclosed.

Heavy crude oils and bitumen represent more than 50% of all hydrocarbons available on the planet. These feedstocks have a low amount of distillable material and high level of contaminants that make their production, transportation, and refining difficult and costly by conventional technologies. Subsurface Upgrading of Heavy Crude Oils and Bitumen is of interest to the petroleum industry mainly because of the advantages compared to aboveground counterparts. The author presents an in-depth account and a critical

review of the progress of industry and academia in underground or In-Situ upgrading of heavy, extra-heavy oils and bitumen, as reported in the patent and open literature. This work is aimed to be a standalone monograph, so three chapters are dedicated to the composition of petroleum and fundamentals of crude oil production and refining. Key Features: Offers a multidisciplinary scope that will appeal to chemists, geologists, biologists, chemical engineers, and petroleum engineers Presents the advantages and disadvantages of the technologies considered Discusses economic and environmental considerations for all the routes evaluated and offers perspectives

from experts in the field working with highlighted technologies
Capable of handling heavier feedstocks than other refining techniques, hydroprocessing enables refineries to produce higher quality hydrocarbon products from more unconventional - and formerly wasted - petroleum sources. Hydroprocessing of Heavy Oils and Residua illustrates how to obtain maximum yields of high-value products from heavier oils and residue using currently available hydroprocessing technologies. While most resources on hydroprocessing concentrate on gas oil and lower boiling products, this book details the chemistry involved and the process modifications required for

hydroprocessing heavy crude oils and residua. Emphasizing the use of effective catalysts to ensure cleaner and more efficient industrial fuel processes, the book presents key principles of heterogeneous catalyst preparation, catalyst loading, and reactor systems. It explains how to evaluate and account for catalysts, reactor type, process variables, feedstock type, and feedstock composition in the design of hydroprocessing operations. The text concludes with examples of commercial processes and discusses methods of hydrogen production. Features, Details the properties, composition, and morphology of heavy and extra heavy oils, Describes the development of reactors and the

process conditions necessary for upgrading heavy oils and residues, Presents traditional and novel methods of catalyst preparation, characterization, and monitoring on laboratory and industrial scales, Illustrates the use of computational methods to elucidate preparation-structure relationships between the catalyst development and feedstock properties, Provides a concise description of novel synthesis methods while updating more traditional processes, To meet the growing demand for transportation fuels and fuel oil, modern oil refineries must produce high quality fuel products from increasingly heavy feedstocks. Hydroprocessing of Heavy Oils and Residua contains

the fundamental concepts, technologies, and process modifications refineries need to adapt current hydroprocessing technologies for processing heavier feedstocks. Book jacket.

Heavy oils, extra-heavy oils and tar sands are major players for the future of energy.They represent a massive world resource, at least the size of conventional oils. They are found all over the world but Canada and Venezuela together account, by themselves, for more than half of world deposits. They share the same origin as the lighter conventional oils, but their geological fate drove them into thick, viscous tar-like crude oils. Most of them result from alteration processes mediated by

microbial degradation. They are characterized by a low content of lighter cuts and a high content of impurities such as sulfur and nitrogen compounds and metals ; so, their production is difficult and deployment of specific processes is required in order to enhance their transportability and to upgrade them into valuable products meeting market needs, and honouring environmental requirements.Although these resources are increasingly becoming commercially producible, less than 1% of total heavy crude oil deposits worldwide are under active development. The voluntarily wide scope of this volume encompasses geology, production, transportation,

upgrading, economics and environmental issues of heavy oils. It does not pretend to be exhaustive, but to provide an authoritative view of this very important energy resource.

Processing of Heavy Crude Oils

Upgrading, government and environment

Participant Notebook, December 9-10, 1985, Sheraton Plaza La Reina Hotel, Los Angeles, CA.

Heavy Oil Production Processes

Post Production Heavy Oil Operations

Diluted bitumen has been transported by pipeline in the United States for more than 40 years, with the amount increasing recently as a result of improved

extraction technologies and resulting increases in production and exportation of Canadian diluted bitumen. The increased importation of Canadian diluted bitumen to the United States has strained the existing pipeline capacity and contributed to the expansion of pipeline mileage over the past 5 years. Although rising North American crude oil production has resulted in greater transport of crude oil by rail or tanker, oil pipelines continue to deliver the vast majority of crude oil supplies to U.S. refineries. Spills of Diluted Bitumen from Pipelines examines the

current state of knowledge and identifies the relevant properties and characteristics of the transport, fate, and effects of diluted bitumen and commonly transported crude oils when spilled in the environment. This report assesses whether the differences between properties of diluted bitumen and those of other commonly transported crude oils warrant modifications to the regulations governing spill response plans and cleanup. Given the nature of pipeline operations, response planning, and the oil industry, the recommendations outlined in

this study are broadly applicable to other modes of transportation as well. Heavy Oil Recovery and Upgrading covers properties, factors, methods and all current and upcoming processes, giving engineers, new and experienced, the full spectrum of recovery choices, including SAGD, horizontal well technology, and hybrid approaches. Moving on to the upgrading and refining of the product, the book also includes information on in situ upgrading, refining options, and hydrogen production. Rounding out with environmental effects, management methods on

refinery waste, and the possible future configurations within the refinery, this book provides engineers with a single source to make decisions and manage the full range of challenges. Presents the properties, mechanisms, screening criteria and field applications for heavy oil enhanced recovery projects Includes current upgrading options and future methods for refining heavy oil development Fills in the gaps between literature and practical application for everyday industry reference The immediate product extracted from oil and gas wells consists of mixtures

of oil, gas, and water that is difficult to transport, requiring a certain amount of field processing. This reference analyzes principles and procedures related to the processing of reservoir fluids for the separation, handling, treatment, and production of quality petroleum oil and gas products. It details strategies in equipment selection and system design, field development and operation, and process simulation and control to increase plant productivity and safety and avoid losses during purification, treatment, storage, and export. Providing guidelines

for developing efficient and economical treatment systems, the book features solved design examples that demonstrate the application of developed design equations as well as review problems and exercises of key engineering concepts in petroleum field development and operation.

State-of-the-art oilsands processing technologies, from laboratory to full commercial scale.

From Geology to Upgrading : an Overview

Heavy Oil--a Major Energy Source for the 21st Century

Spills of Diluted Bitumen from Pipelines

Introduction to Petroleum

Biotechnology
Congressional Budget Request

Includes topics not found together in books on petroleum processing: economics, automation, process modeling, online optimization, safety, environmental protection Combines overviews of petroleum composition, refinery processes, process automation, and environmental protection with comprehensive chapters on recent advances in hydroprocessing, FCC, lubricants, hydrogen management Gives diverse perspectives, both geographic and topical, because contributors include experts

from eight different countries in North America, Europe and Asia, representing oil companies, universities, catalyst vendors, process licensors, consultants and engineering contractors

Effective measurement of the composition and properties of petroleum is essential for its exploration, production, and refining; however, new technologies and methodologies are not adequately documented in much of the current literature. Analytical Methods in Petroleum Upstream Applications explores advances in the analytical methods and instrument

The transportation of heavy oil is a pressing problem. Various methods have been devised to mitigate the reluctance to flow of these highly dense and viscous oils. This study is focused on evaluating a case for post-production partial upgrading of heavy oil. Specifically, we analyze the impact of visbreaking, a mild thermal cracking method, on the economic and energy demands of the post-production process. Using conservative modeling techniques and principles we find significant cost and energy savings can potentially result out of visbreaking. Cost savings result as a consequence of

reduced diluent usage. Even the most conservative modeling scenario under consideration exhibits significant cost savings in the form of reduced diluent usage; these savings not only offset operational costs but provide short payback periods on capital expenditures. Additionally, the lower gravity blend resulting from visbreaking can also bring about energy and cost savings in pipeline transportation and positively impact the heavy oil value chain from the producer to a refinery or regional upgrading facility. From this basic analysis of the potential of visbreaking, we can recommend investing resources

to study its viability in the field. Using this analysis as a tipping off point and with a detailed look at the chemistry of the oil in question it is possible to make a very viable case for visbreaking. In a similar vein, this analysis can serve as a guide in making a case for other partial upgrading methods as well. The electronic version of this dissertation is accessible from http://hdl.handle.net/1969.1/148289

Heavy crude oils and bitumen represent more than 50% of all hydrocarbons available on the planet. These feedstocks have a low amount of distillable material and high level of

contaminants that makes their production, transportation, and refining difficult and costly by conventional technologies. Subsurface upgrading of heavy crude oils and bitumen is of interest to the petroleum industry mainly because of the advantages compared to aboveground counterparts. This book presents an " in depth " account and a critical review of the progress of industry and academia in the area of subsurface upgrading of heavy, extra-heavy oils and bitumen, as reported in the patent and open literature.

Subsurface Upgrading of Heavy Crude Oils and Bitumen

Report
Heavy crude and tar sands
Asphaltenes
Upgrading Oilsands Bitumen and Heavy Oil
As conventional-oil resources are depleted worldwide, vast heavy oil reserves available in various parts of the world become increasingly important as a secure future energy source. Brief but readable, Heavy Oil Production Processes discusses the latest improvements in production processes including; thermal methods (steam floods, cyclic steam stimulation, SAGD) as well

as non-thermal methods (cold flow with sand production, cyclic solvent process, VAPEX). The book begins with an overview of the chemistry, engineering, and technology of heavy oil as they evolve into the twenty-first century. The preceding chapters are written to provide a basic understanding of each technology, evolving processes and new processes as well as the various environmental regulations. Clear and rigorous, Heavy Oil Production Processes will prove useful for those

scientists and engineers already engaged in fossil fuel science and technology as well as scientists, non-scientists, engineers, and non-engineers who wish to gain a general overview or update of the science and technology of fossil fuels. The not only does the book discuss the production processes but also provides methods which should reduce environmental footprint and improve profitability. Overview of the chemistry, engineering, and technology of oil sands Updates on the evolving processes and new

processes Evolving and new environmental regulations regarding oil sands production
Fundamentals of Petroleum Refining presents the fundamentals of thermodynamics and kinetics, and it explains the scientific background essential for understanding refinery operations. The text also provides a detailed introduction to refinery engineering topics, ranging from the basic principles and unit operations to overall refinery economics. The book covers important topics, such as clean fuels,

gasification, biofuels, and environmental impact of refining, which are not commonly discussed in most refinery textbooks. Throughout the source, problem sets and examples are given to help the reader practice and apply the fundamental principles of refining. Chapters 1-10 can be used as core materials for teaching undergraduate courses. The first two chapters present an introduction to the petroleum refining industry and then focus on feedstocks and products. Thermophysical properties

of crude oils and petroleum fractions, including processes of atmospheric and vacuum distillations, are discussed in Chapters 3 and 4. Conversion processes, product blending, and alkylation are covered in chapters 5-10. The remaining chapters discuss hydrogen production, clean fuel production, refining economics and safety, acid gas treatment and removal, and methods for environmental and effluent treatments. This source can serve both professionals and students (on

undergraduate and graduate levels) of Chemical and Petroleum Engineering, Chemistry, and Chemical Technology. Beginners in the engineering field, specifically in the oil and gas industry, may also find this book invaluable. Provides balanced coverage of fundamental and operational topics Includes spreadsheets and process simulators for showing trends and simulation case studies Relates processing to planning and management to give an integrated picture of

refining

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 hydroprocesing 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.
"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!" Oil and Gas Production Handbook: An Introduction to Oil and Gas Production Reservoir Characterization and Production Monitoring Modeling of Processes and Reactors for Upgrading of

Heavy Petroleum Challenges and Opportunities

Enhanced Recovery Methods for Heavy Oil and Tar Sands

With the depletion of conventional crude oil reserves in the world, heavy oil and bitumen resources have great potential to meet the future demand for petroleum products. However, oil recovery from heavy oil and bitumen reservoirs is much more difficult than that from conventional oil reservoirs. This is mainly because heavy oil or bitumen is partially or completely immobile under reservoir

conditions due to its extremely high viscosity, which creates special production challenges. In order to overcome these challenges significant efforts were devoted by Applied Research Center (ARC) at Florida International University and The Center for Energy Economics (CEE) at the University of Texas. A simplified model was developed to assess the density of the upgraded crude depending on the ratio of solvent mass to crude oil mass, temperature, pressure and the properties of the crude oil. The simplified model incorporated the

interaction dynamics into a homogeneous, porous heavy oil reservoir to simulate the dispersion and concentration of injected CO2. The model also incorporated the characteristic of a highly varying CO2 density near the critical point. Since the major challenge in heavy oil recovery is its high viscosity, most researchers have focused their investigations on this parameter in the laboratory as well as in the field resulting in disparaging results. This was attributed to oil being a complex poly-disperse blend of light and heavy paraffins, aromatics,

resins and asphaltenes, which have diverse behaviors at reservoir temperature and pressures. The situation is exacerbated by a dearth of experimental data on gas diffusion coefficients in heavy oils due to the tedious nature of diffusivity measurements. Ultimately, the viscosity and thus oil recovery is regulated by pressure and its effect on the diffusion coefficient and oil swelling factors. The generation of a new phase within the crude and the differences in mobility between the new crude matrix and the precipitate readily enables removal of asphaltenes.

Thus, an upgraded crude low in heavy metal, sulfur and nitrogen is more conducive for further purification. As feedstocks to refineries change, there must be an accompanying change in refinery technology. This means a movement from conventional means of refining heavy feedstocks using (typically) coking technologies to more innovative processes that will coax the last drips of liquid fuels from the feedstock. This book presents the evolution of refinery processes during the last century and as well as the means by which refinery processes will

evolve during the next three-to-five decades. Chapters contain material relevant to (1) comparisons of current feedstocks with heavy oil and bio-feedstocks; (2) evolution of refineries since the 1950s, (3) properties and refinability of heavy oil and bio-feedstocks, (4) thermal processes vs. hydroprocesses, and (5) evolution of products to match the environmental market. Process innovations that have influenced refinery processing over the past three decades are presented, as well as the relevant patents that have the potential for

incorporation into future refineries. • Comparison of current feedstocks with heavy oil and bio-feedstocks. • Evolution of refineries over the past three decades. • Properties and refinability of heavy oil and bio-feedstocks. • Thermal processes vs. Hydroprocesses. • Evolution of products to match the environmental market. Investigates the engineering and plant design challenges presented by heavy oil and bio-feedstocks Explores the legislatory and regulatory climate, including increasingly stringent environmental requirements Examines the trade-offs of

thermal processes vs. hydroprocesses

This invaluable book provides a broad and detailed introduction to the fascinating and hot research subject of transformation of biomass-related materials to biofuels. Biofuel production can be categorized into a variety of novel conversion and refinery development technologies. However, biomass recalcitrance is the biggest challenge blocking the way in biofuel conversion. This book provides an enlightening view of the frontiers in leading pretreatments, downstream enzymatic hydrolysis, fermentation

technology, corrosion issues in biofuel and merging biofuels technology into a pulp mill to pave the way for future large-scale biofuel production. Contents:What is Biomass (Fang Huang)Biomass Recalcitrance and the Contributing Cell Wall Factors (Marcus Foston)Reduction of Biomass Recalcitrance via Water/Acid Pretreatments (Fan Hu)Reduction of Biomass Recalcitrance via Organosolv Pretreatments (Xianzhi Meng)Reduction of Biomass Recalcitrance via Ionic Liquid Pretreatments (Alistair W T King, Haibo Xie, Juha Fiskari and Ilkka

Kilpeläinen)Enzymatic Deconstruction of Lignocellulose to Fermentable Sugars (Qining Sun)Fermentation to Bioethanol/Biobutanol (Tao Ma, Matyas Kosa and Qining Sun)Pyrolysis of Biomass to Bio-Oils (Haoxi Ben)Upgrade of Bio-Oil to Bio-Fuel and Bio-Chemical (Haoxi Ben)Corrosion Issues in Biofuels (Lindsey R Goodman and Preet M Singh)Incorporation of Biofuels Technology into a Pulp Mill (Marko Hakovirta)Integrated Possibilities of Producing Biofuels in Chemical Pulping (Raimo Alén) Readership: Scientists and researchers

who are interested in the study of materials and environmental science. Keywo rds:Biofuel;Biomass;Pretreat ment;Enzymatic;Fermentation; Pyrolysis;Pulp Mill;CorrosionKey Features:Detailed description of the key challenge: recalcitrance in biomass conversion into biofuelInterpreting leading bioconversion technologies and in-depth reaction mechanism to resolve this issueProviding broad and practical technologies in large-scale biofuel productionReviews: “This is the most thorough and well explained book on biofuels. It passes through all the

stages of biofuel production, it clearly discusses the challenges and how they could be surpassed, and it is very well structured. Every chapter starts with a clear introduction, builds on, and then draws some conclusions, all based on scientific, peer reviewed paper." ZME Science

Catalysts for Upgrading Heavy Petroleum Feeds

Integrated Oil Production and Upgrading Using Molten Alkali Metal

Fundamentals of Petroleum Refining

Development of the Write Process for Pipeline-Ready Heavy Oil

The Desulfurization of Heavy Oils and Residua