Hydrotreatment And Hydrocracking Of Oil Fractions

Presents detailed information and study cases on experiments on hydrotreating catalysts for the petroleum industry Catalytic hydrotreating (HDT) is a process used in the petroleum refining industry for upgrading hydrocarbon streams—removing impurities, eliminating metals, converting asphaltene molecules, and hydrocracking heavy fractions. The major applications of HDT in refinery operations include feed pretreatment for conversion processes, post-hydrotreating distillates, and upgrading heavy crude oils. Designing HDT processes and catalysts for successful commercial application requires experimental studies based on appropriate methodologies. Experimental Methods for Evaluation of Hydrotreating Catalysts provides detailed descriptions of experiments in different reaction scales for studying the hydrotreating of various petroleum distillates. Emphasizing step-by-step methodologies in each level of experimentation, this comprehensive volume presents numerous examples of evaluation methods, operating conditions, reactor and catalyst types, and process configurations. In-depth chapters describe experimental setup and procedure, analytical methods, calculations, testing and characterization of catalyst and liquid products, and interpretation of experiment data and results. The text describes experimental procedure at different levels of experimentation—glass reactor, batch reactor, continuous stirred tank reactor, and multiple scales of tubular reactors—using model compounds, middle distillates and heavy oil. This authoritative volume: Introduces experimental setups used for conducting research studies, such as type of operation, selection of reactor, and analysis of products Features examples focused on the evaluation of different reaction parameters and catalysts with a variety of petroleum feedstocks Provides experimental data collected from different reaction scales Includes experiments for determining mass transfer limitations and deviation from ideality of flow pattern Presents contributions from leading scientists and researchers in the field of petroleum refining Experimental Methods for Evaluation of Hydrotreating Catalysts is an indispensable reference for researchers and professionals working in the area of catalytic hydrotreating, as well as an ideal textbook for courses in fields such as chemical engineering, petrochemical engineering, and biotechnology.

The use of lubricants began in ancient times and has developed into a major international business through the need to lubricate machines of increasing complexity. The impetus for lubricant development has arisen from need, so lubricating practice has preceded an understanding of the scientific principles. This is not surprising as the scientific basis of the technology is, by nature, highly complex and interdisciplinary. However, we believe that the understanding of lubricant phenomena will continue to be developed at a molecular level to meet future challenges. These challenges will include the control of emissions from internal combustion engines, the reduction of friction and wear in and continuing improvements to lubricant performance and machinery, life-time. More recently, there has been an increased understanding of the chemical aspects of lubrication, which has complemented the knowledge and understanding gained through studies dealing with physics and engineering. This book aims to bring together this chemical information and present it in a practical way. It is written by chemists who are authorities in the various specialisations within the lubricating industry, and is intended to be of interest to chemists who may already be working in the lubricating industry or in academia, and who are seeking a chemist's view of lubrication. It will also be of benefit to engineers and technologists familiar with the industry who require a more fundamental understanding of lubricants.

The purpose of this study is to evaluate a processing pathway for converting biomass into infrastructure-compatible hydrocarbon biofuels. This design case investigates production of fast pyrolysis oil from biomass and the upgrading of that bio-oil as a means for generating infrastructure-ready renewable gasoline and diesel fuels. This study has been conducted using

similar methodology and underlying basis assumptions as the previous design cases for ethanol. The overall concept and specific processing steps were selected because significant data on this approach exists in the public literature. The analysis evaluates technology that has been demonstrated at the laboratory scale or is in early stages of commercialization. The fast pyrolysis of biomass is already at an early stage of commercialization, while upgrading bio-oil to transportation fuels has only been demonstrated in the laboratory and at small engineering development scale. Advanced methods of pyrolysis, which are under development, are not evaluated in this study. These may be the subject of subsequent analysis by OBP. The plant is designed to use 2000 dry metric tons/day of hybrid poplar wood chips to produce 76 million gallons/year of gasoline and diesel. The processing steps include: 1. Feed drying and size reduction 2. Fast pyrolysis to a highly oxygenated liquid product 3. Hydrotreating of the fast pyrolysis oil to a stable hydrocarbon oil with less than 2% oxygen 4. Hydrocracking of the heavy portion of the stable hydrocarbon oil 5. Distillation of the hydrotreated and hydrocracked oil into gasoline and diesel fuel blendstocks 6. Hydrogen production to support the hydrotreater reactors. The "as received" feedstock to the pyrolysis plant will be "reactor ready". This development will likely further decrease the cost of producing the fuel. An important sensitivity is the possibility of co-locating the plant with an existing refinery. In this case, the plant consists only of the first three steps: feed prep, fast pyrolysis, and upgrading. Stabilized, upgraded pyrolysis oil is transferred to the refinery for separation and finishing into motor fuels. The off-gas from the hydrotreaters is also transferred to the refinery, and in return the refinery provides lower-cost hydrogen for the hydrotreaters. This reduces the capital investment. Production costs near $2/gal (in 2007 dollars) and petroleum industry infrastructure-ready products make the production and upgrading of pyrolysis oil to hydrocarbon fuels an economically attractive source of renewable fuels. The study also identifies technical areas where additional research can potentially lead to further cost improvements.

This work is based on the proceedings of the American Institute of Chemical Engineers' Spring National Meeting in Houston, Texas, March 28 to April 1, 1993. It details various facets of residue upgrading and distillate hydrotreating, stressing the importance of selective catalysts in aromatics reduction. New aromatics saturation processes for the production of very low-aromatic distillates are introduced.

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This book provides an unparalleled contemporary assessment of hydrocarbon chemistry – presenting basic concepts, current research, and future applications. • Comprehensive and updated review and discussion of the field of hydrocarbon chemistry • Includes literature coverage since the publication of the previous edition • Expands or adds coverage of: carboxylation, sustainable hydrocarbons, extraterrestrial hydrocarbons • Addresses a topic of special relevance in contemporary science, since hydrocarbons play a role as a possible replacement for coal, petroleum oil, and natural gas as well as their environmentally safe use • Reviews of prior edition: “...literature coverage is comprehensive and ideal for quickly reviewing specific topics...of most value to industrial chemists...” (Angewandte Chemie) and “...useful for chemical engineers as well as engineers in the chemical and petrochemical industries.” (Petroleum Science and Technology)

The 2nd International Symposium on Hydrotreatment and Hydrocracking of Oil Fractions, which is also the 7th in the series of European Workshops on Hydrotreatment, took place in Antwerpen, Belgium from November 14 to 17. The Symposium emphasized how oil refining faces increasingly severe environmental regulations. These and the increasing application of heavier crudes containing more S-, N- and metal components call for more efficient hydrotreatment and hydrocracking processes. It is clear from the keynote lectures, the oral contributions and the posters of

this meeting that adapting the operating conditions will not suffice. Adequate catalysts need to be developed, with different composition and structure. Surface science techniques and molecular modeling are now well established tools for such a development. They should be of help in widely different aspects, like the role of precursors in the preparation or the modifications undergone by the catalyst under reaction conditions. The improvement of hydrotreatment and hydrocracking also needs accurate modeling of the chemical reactor. This requires more representative hydrodynamics and kinetic models whose validity extends to the very low S- and N-contents. These areas should be vigorously developed.

These proceedings reflect the important role of catalysis in petroleum refining and the effects of factors such as environmental legislation on the industry. They also show the emergence of significant scientific expertise in the Middle East - the cradle of the oil industry. Participants from all over the world took part in the meeting and the book contains a well-balanced selection of articles from both academia and industry. Current trends in the oil industry focused attention mainly on heavy end hydrotreating, but other processes also gained their share of attention. An invaluable feature of the meeting was the two panel discussions where participants took the opportunity to obtain advance on many real and immediate problems.

Catalysis is literally the heart of many petroleum refining processes and therefore of ongoing interest to those in and around the refining industry. In easy-to-grasp language and format, Petroleum Catalysis in Nontechnical Language examines fluid catalytic cracking (FCC), reforming, hydrotreating, hydrocracking, isomerization, and polymerization, as well as catalysts of the future such as enzymes.

Hydrocarbons and their transformations play major roles in chemistry as raw materials and sources of energy. Diminishing petroleum supplies, regulatory problems, and environmental concerns constantly challenge chemists to rethink and redesign the industrial applications of hydrocarbons. Written by Nobel Prize-winner George Olah and hydrocarbon expert Árpád Molnár, the completely revised and expanded Second Edition of Hydrocarbon Chemistry provides an unparalleled contemporary assessment of the field, presenting basic concepts, current research, and future applications. Hydrocarbon Chemistry begins by discussing the general aspects of hydrocarbons, the separation of hydrocarbons from natural sources, and the synthesis from C1 precursors with recent developments for possible future applications. Each successive chapter deals with a specific type of hydrocarbon transformation. The Second Edition includes a new section on the chemical reduction of carbon dioxide–focusing on catalytic, ionic, electrocatalytic, photocatalytic, and ezymatic reductions–as well as a new chapter on new catalysts and activation methods, combinatorial chemistry, and environmental chemistry. Other topics covered include: Major processes of the petrochemical industry, such as cracking, reforming, isomerization, and alkylation Derivation reactions to form carbon-heteroatom bonds Hydrocarbon oxidations Metathesis Oligomerization and polymerization of hydrocarbons All chapters have been updated by adding sections on recent developments to review new advances and results. Essential reading for practicing scientists in industry, polymer and catalytic chemists, as well as researchers and graduate students, Hydrocarbon Chemistry, Second Edition remains the benchmark text in its field.

Written by a scientist with more than 25 years of experience in the field, this serves as a

complete guide to catalyst activity loss during the hydroprocessing of heavy oils. Deactivation of Heavy Oil Hydroprocessing Catalysts offers a rigorous exploration of a wide range of topics in the field, including the physical and chemical properties of heavy oils and hydroprocessing catalysts; the mechanisms of catalyst deactivation; catalyst characterization by a variety of techniques and reaction conditions; and laboratory and commercial information for model validations. The content demonstrates how to develop correlations and models for a variety of reaction scales with step-by-step descriptions and detailed experimental data. It also contains important implications for increasing operational efficiencies within the petroleum industry. With in-depth explanations of models and mechanisms not found in other literature, Deactivation of Heavy Oil Hydroprocessing Catalysts is an essential reference that industry researchers and engineering students will turn to again and again. Serves as a complete guide to catalyst activity loss during the hydroprocessing of heavy oils, written by a scientist with more than 25 years of experience in the field Explores the physical and chemical properties of heavy oils and hydroprocessing catalysts; the mechanisms of catalyst deactivation; catalyst characterization by a variety of techniques and reaction conditions; laboratory and commercial information for model validations; and more Demonstrates how to develop correlations and models for a variety of reaction scales with step-by-step descriptions and detailed experimental data Contains important implications for increasing operational efficiencies within the petroleum industry Offers an essential reference for professionals and researchers working in the refining industry, as well as students taking courses on chemical reaction engineering

The demand for hydroprocessing catalysts has shown an increasing trend, because of their applications in refining of petroleum and biofuels, in order to comply with strict environmental regulations controlling emissions from transportation vehicles. Transport fuel is dominated by fossil fuels with carbon emission intensive production methods. If we are to move away from these sources, the alternative is to produce liquid fuels from agricultural stocks -- crops, crop waste, forestry waste or algae. Converting these feedstocks into high quality fuels is a considerable challenge. By describing the current status in processing agricultural feedstock into high quality liquid transport fuels, the authors set out the means to develop better chemistry and catalysis for the necessary conversion processes. This book offers an intriguing insight into the mechanisms and protocols involved in new hydroprocessing catalysts and processes, and covers the methods for upgrading these liquids to modern transport vehicles suitable for operation in modern gasoline and diesel engines. It provides an introduction to the mechanism of hydroprocessing reactions, application of different metals in hydroprocessing, the effect of catalyst supports, applications in refining new feedstock, renewable fuels standards, the management of spent hydroprocessing catalysts, and hydrogen production. Hydroprocessing Catalysts and Processes will prove useful for both researchers in academe and industry concerned with future fuels development and treatment to produce current and future liquid transport fuels. Contents: PrefaceHydroprocessing and the ChemistryStabilization of Bio-Oil to Enable Its Hydrotreating to Produce Bio-FuelsHydroprocessing Catalysts: Inexpensive Ni Based Non-Sulfided CatalystsCatalytic Upgrading of Pinewood Pyrolysis Bio-Oil Over Carbon-Encapsulated Bimetallic Co-Mo Carbides and Sulfides CatalystsHydroprocessing Catalysts for Algal BiofuelsEffects of Catalyst Support on HydroprocessingCommercial Hydroprocessing

Processes for Bio-FeedstockRenewable Fuels and Fuel Regulations and StandardsSpent Hydroprocessing Catalysts ManagementHydrogen Production Readership: Graduate students in catalysis, refinery feedstock operations and planners, fuel technologists. Keywords: Hydrodesulfurization;Hydrodenitrogenation;Hydrodeoxygenation;Hydrogenation;Hydrocracking;Hydrodemetallization;Hydroprocessing Catalyst Model;Bio-Oil Stabilization;Ni Based Catalysts;Cobalt-Molybdenum Carbide Catalysts;Algal Biofuels;Support Effect;Commercial Hydroprocessing Processes for Bio-feedstock;Neste MY;BP;Ecofining;ENI;Honeywell-UOP;Bio-Synfining;Vegan;HydroFlex;Renewable Fuels Standards;Spent Hydroprocessing Catalyst;Hydrogen ProductionReview: Key Features: Most recent books related to hydroprocessing catalysts were published over 8 years agoNew challenges in biorefining and petroleum refining have required development of entirely new catalyst formulations and improvements of currently used catalystsIt is anticipated that the consumption of hydroprocessing catalysts will show a significant increase in the near future

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.

This handbook describes and discusses the features that make up the petroleum refining industry. It begins with a description of the crude oils and their nature, and continues with the saleable products from the refining processes, with a review of the

environmental impact. There is a complete overview of the processes that make up the refinery with a brief history of those processes. It also describes design technique, operation, and, in the case of catalytic units, the chemistry of the reaction routes. These discussions are supported by calculation procedures and examples, sufficient to enable input to modern computer simulation packages.

Hydrotreating catalysis with transition metal sulphides is one of the most important areas of industrial heterogeneous catalysis. The present book deals with the chemical and catalytic aspects of transition metal sulphides, focusing on their use in hydrotreating catalysis. The book¿s 12 chapters present reviews of solid-state, coordination and organometallic chemistry, surface science and spectroscopic studies, quantum chemical calculations, catalytic studies with model and real catalysts, as well as refinery processes. A presentation of state-of-the-art background to pertinent work in the field. Can be used as an introduction to the chemical and catalytic properties of transition metal sulphides as well as an advanced level reference.

Provides a holistic approach that looks at changing process conditions, possible process design changes, and process technology upgrades Includes process integration techniques for improving process designs and for applying optimization techniques for improving operations focusing on hydroprocessing units. Discusses in details all important aspects of hydroprocessing – including catalytic materials, reaction mechanism, as well as process design, operation and control, troubleshooting and optimization Methods and tools are introduced that have a successful application track record at UOP and many industrial plants in recent years Includes relevant calculations/software/technologies hosted online for purchasers of the book

Disclosed herein is a method of generating hydrogen from a bio-oil, comprising hydrogenating a water-soluble fraction of the bio-oil with hydrogen in the presence of a hydrogenation catalyst, and reforming the water-soluble fraction by aqueous-phase reforming in the presence of a reforming catalyst, wherein hydrogen is generated by the reforming, and the amount of hydrogen generated is greater than that consumed by the hydrogenating. The method can further comprise hydrocracking or hydrotreating a lignin fraction of the bio-oil with hydrogen in the presence of a hydrocracking catalyst wherein the lignin fraction of bio-oil is obtained as a water-insoluble fraction from aqueous extraction of bio-oil. The hydrogen used in the hydrogenating and in the hydrocracking or hydrotreating can be generated by reforming the water-soluble fraction of bio-oil.

The development of efficient catalysts for hydrodesulfurization (HDS) and hydrodenitrogenation (HDN) processes is an essential and urgent research field. During oil refinement the removal of sulfur and nitrogen compounds from petroleum feedstock is crucial, as the emission of sulfur and nitrogen oxides into the atmosphere causes severe environmental problems. In light of the industrial process for hydrocarbons, HDS is indispensable as it eliminates the poisoning of catalysts during hydrotreatment and hydrocracking. In order to develop new catalysts, the mechanism of these reactions as well as the structures and functions of the catalysts need to be elucidated. This book provides an up-to-date and deep insight, which spans kinetic studies, catalytic cycles, structures and properties of catalysts to process engineering. Therefore every chemist and engineer working in this important research field will welcome this valuable source of information.

To meet changing market demands that have stringent emission standards and to ensure proper performance in refinery units, evaluation of novel catalyst designs and results from material characterization and testing of catalysts are of crucial importance for refiners as well as for catalyst manufacturers. This book highlights recent developments in the application of refinery catalysts in selected units such as fluid catalytic cracking (FCC), hydrogen production for hydroprocessing units, hydrotreating, hydrocracking, and sustainable processing of biomass into biofuels.

Chemical reactor engineering, as a discipline, has a central role to play in helping with the development of adequate strategies and technologies that can deal effectively with the concerns of today's society, which are increasingly becoming attuned to the environment. The current challenge is how to adapt present processes and products to meet more rigorous environmental standards. Chemical Reactor Technology for Environmentally Safe Reactors and Products addresses these issues in three parts: I -- Fuels of the Future and Changing Fuel Needs; II -- Alternative Sources; III -- Emission Control, Chemical Reactor Safety and Engineering. Attention is also paid, throughout the text, to the fundamental technological aspects of reactor engineering and to possible strategies for bridging knowledge gaps.

A reference that details the pertinent chemical reactions and emphasizes the plant design and operations of petroleum processing procedures. The handbook is divided into four sections: products, refining, manufacturing processes, and treating processes. Wherever possible, shortcut methods of calcula

This volume describes the characteristics of processes used in petroleum refining: upgrading light fractions (reforming and isomerization), converting distillates (catalytic cracking, hydrocracking, and associated equipment), converting residues (visbreaking, coking hydroconversion), and reducing air and water pollution (white product sweetening, acid gas, stack gas, and waste water treatment). This book is available in French Under the title "le raffinage du pétrole. Tome 3. Procédés de transformation". Contents : 1. Introduction. 2. Basic principles governing chemical changes. 3. Industrial catalysts. 4. Catalytic reforming. 5. Catalytic cracking. 6. Isomerization of light paraffins. 7. Aliphatic alkylation. 8. Olefin etherification. 9. Oligomerization. 10. Hydrocracking. 11. Visbreaking of residues. 12. Coking. 13. Residue hydroconversion. 14. Hydrogen production. 15. White products refining by sweetening. 16. Hydrotreating. 17. Acid gas treatment. 18. Desulfurization of stack gases. 19. Water treatment. References. Index.

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

Modeling and Simulation of Catalytic Reactors for Petroleum Refining deals with fundamental descriptions of the main conversion processes employed in the petroleum refining industry: catalytic hydrotreating, catalytic reforming, and fluid catalytic cracking. Common approaches for modeling of catalytic reactors for steady-state and dynamic simulations are also described and analyzed. Aspects such as thermodynamics, reaction kinetics, process variables, process scheme, and reactor design are discussed in detail from both research and commercial points of view. Results of simulation with the developed models are compared with those determined at pilot plant scale as well as commercial practice. Kinetics data used in the reactor model are either taken from the literature or obtained under controlled experiments at the laboratory.

Presents advances in the field of hydrocracking. The volume includes catalytic materials, reaction mechanisms and pathways, as well as hydrocracking processes and applications. It discusses hydrocracking processes and hydrocracking technology in catalytic dewaxing, resid upgrading, and fluid catalytic cracking feedstock improvement

The symposium on Hydrotreatment and Hydrocracking of Oil Fractions aims to provide a global perspective and an inspection of the state-of-the-art of these processes. New American, European and Japanese environmental regulations call for advanced hydrotreatment processes for HDS and HDN for the removal of S- and Ni-components from oil fractions. These will alter the product slate of the oil refineries and the hydrocarbon composition of these products. Hydrocracking will play an important part in this shift. Adapting the operating conditions will not suffice to reach the desired product specifications and yields. Adequate catalysts will have to be developed. Powerful tools are now available for this, e.g. surface science techniques, molecular modeling and new types of reactors operated in a nonsteady mode. Another instrument in the improvement of hydrotreatment and hydrocracking units is the availability of more

realistic kinetic models. These are based on a judicious insight into the reaction mechanism, also provided by the above-mentioned tools. Progress in the analytical techniques has allowed the reduction of the lumping of components in these kinetic models and first order kinetic equations are gradually replaced by equations accounting for the adsorption of the various components. More detailed and more realistic reactor models are now based on rigorous hydrodynamic models and their application has become possible through the rapidly increasing possibilities of computers.

There is a renaissance that is occurring in chemical and process engineering, and it is crucial for today's scientists, engineers, technicians, and operators to stay current. With so many changes over the last few decades in equipment and processes, petroleum refining is almost a living document, constantly needing updating. With no new refineries being built, companies are spending their capital re-tooling and adding on to existing plants. Refineries are like small cities, today, as they grow bigger and bigger and more and more complex. A huge percentage of a refinery can be changed, literally, from year to year, to account for the type of crude being refined or to integrate new equipment or processes. This book is the most up-to-date and comprehensive coverage of the most significant and recent changes to petroleum refining, presenting the state-of-the-art to the engineer, scientist, or student. Useful as a textbook, this is also an excellent, handy go-to reference for the veteran engineer, a volume no chemical or process engineering library should be without. Written by one of the world's foremost authorities, this book sets the standard for the industry and is an integral part of the petroleum refining renaissance. It is truly a must-have for any practicing engineer or student in this area.

A timely, hands-on guide to environmental issues and regulatorystandards for the petroleum industry Environmental analysis and testing methods are an integral part ofany current and future refining activities. Today's petroleumrefining industry must be prepared to meet a growing number ofchallenges, both environmental and regulatory. Environmental Analysis and Technology for the Refining Industryfocuses on the analytical issues inherent in any environmentalmonitoring or cleanup program as they apply to today's petroleumindustry, not only during the refining process, but also duringrecovery operations, transport, storage, and utilization. Designedto help today's industry professionals identify test methods formonitoring and cleanup of petroleum-based pollutants, the bookprovides examples of the application of environmental regulationsto petroleum refining and petroleum products, as well as currentand proposed methods for the mitigation of environmental effectsand waste management. Part I introduces petroleum technology, refining, and products, andreviews the nomenclature used by refiners, environmentalscientists, and engineers. Part II discusses environmentaltechnology and analysis, and provides information on environmentalregulation and the impact of refining. Coverage includes: * In-depth descriptions of analyses related to gaseous emissions,liquid effluents, and solid waste * A checklist of relevant environmental regulations * Numerous real-world examples of the application of environmentalregulations to petroleum refining and petroleum products * An analysis of current and proposed methods of environmentalprotection and waste management