



On January 1988, the ascertained and economically accessible reserves of Natural Gas (NG) amounted to over 144,000 billion cubic meters worldwide, corresponding to 124 billion tons of oil equivalents (comparable with the liquid oil reserves, which are estimated to be 138 billion TOE). It is hypothesized that the volume of NG reserve will continue to grow at the same rate of the last decade. Forecasts on production indicate a potential increase from about 2,000 billion cubic meters in 1990 to not more than 3,300 billion cubic meters in 2010, even in a high economic development scenario. NG consumption represents only one half of oil: 1.9 billion TOE/y as compared to 3.5 of oil. Consequently, in the future gas will exceed oil as a carbon atom source. In the future the potential for getting energetic vectors or petrochemicals from NG will continue to grow. The topics covered in Natural Gas Conversion V reflect the large global R&D effort to look for new and economic ways of NG exploitation. These range from the direct conversion of methane and light paraffins to the indirect conversion through synthesis gas to fuels and chemicals. Particularly underlined and visible are the technologies already commercially viable. These proceedings prove that mature and technologically feasible processes for natural gas conversion are already available and that new and improved catalytic approaches are currently developing, the validity and feasibility of which will soon be documented. This is an exciting area of modern catalysis, which will certainly open novel and rewarding perspectives for the chemical, energy and petrochemical industries.

This book provides a general overview of syngas technologies as well as an in-depth analysis of the steam reforming process. Syngas is a mixture of hydrogen and carbon oxides which can be made from hydrocarbons, coal and biomass. It is an important intermediate in the chemical industry for manufacture of ammonia, methanol and other petrochemicals as well as hydrogen for refineries and fuel cells. Syngas is playing a growing role in the energy sector, because it can be converted into a number of important energy carriers and fuels. Syngas catalysis creates new options and flexibility in the complex energy network. The steam reforming process is the main technology today for manufacture of syngas. It is a complex inter-mingling of catalysis and heat transfer with restrictions caused by secondary phenomena such as carbon formation. Many of the principles are applicable for other gasification technologies of growing importance. Concepts of Syngas Preparation aims to provide a comprehensive introduction to this complex field of growing importance and gives a detailed analysis of the catalyst and process problems. This book also serves as an important link between science and industry by illustrating how the basic principles can be

applied to solve design issues and operational problems./a

Industrial Catalytic Processes for Fine and Specialty Chemicals

From Feedstock to Energy Production

Coal Gasification and Its Applications

Ammonia

Membrane Reactors for Energy Applications and Basic Chemical Production

This second edition Encyclopedia supplies nearly 350 gold standard articles on the methods, practices, products, and standards influencing the chemical industries. It offers expertly written articles on technologies at the forefront of the field to maximize and enhance the research and production phases of current and emerging chemical manufacturing practices and techniques. This collecting of information is of vital interest to chemical, polymer, electrical, mechanical, and civil engineers, as well as chemists and chemical researchers. A complete reconceptualization of the classic reference series the Encyclopedia of Chemical Processing and Design, whose first volume published in 1976, this resource offers extensive A-Z treatment of the subject in five simultaneously published volumes, with comprehensive indexing of all five volumes in the back matter of each tome. It includes material on the design of key unit operations involved with chemical processes; the design, unit operation, and integration of reactors and separation systems; process system peripherals such as pumps, valves, and controllers; analytical techniques and equipment; and pilot plant design and scale-up criteria. This reference contains well-researched sections on automation, equipment, design and simulation, reliability and maintenance, separations technologies, and energy and environmental issues. Authoritative contributions cover chemical processing equipment, engineered systems, and laboratory apparatus currently utilized in the field. It also presents expert overviews on key engineering science topics in property predictions, measurements and analysis, novel materials and devices, and emerging chemical fields. ALSO AVAILABLE ONLINE This

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Industrial Catalytic Processes for Fine and Specialty Chemicals provides a comprehensive methodology and state-of-the art toolbox for industrial catalysis. The book begins by introducing the reader to the interesting, challenging, and important field of catalysis and catalytic processes. The fundamentals of catalysis and catalytic processes are fully covered before delving into the important industrial applications of catalysis and catalytic processes, with an emphasis on green and sustainable technologies. Several case studies illustrate new and sustainable ways of designing catalysts and catalytic processes. The intended audience of the book includes researchers in academia and industry, as well as chemical engineers, process development chemists, and technologists working in chemical industries and industrial research laboratories. Discusses the fundamentals of catalytic processes, catalyst preparation and characterization, and reaction engineering Outlines the homogeneous catalytic processes as they apply to specialty chemicals Introduces industrial catalysis and catalytic processes for fine chemicals Includes a number of case studies to demonstrate the various processes and methods for designing green catalysts

The chemical or biological process whereby the presence of an external compound, a catalyst, serves as an agent to cause a chemical reaction to occur or to improve reaction performance without altering the external compound. Catalysis is a very important process from an industrial point of view since the production of most industrially important chemicals involve catalysis. Research into catalysis is a major field in applied science, and involves many fields of chemistry and physics. The new book brings together leading research in this vibrant field.

This book summarizes recent findings on the use of new nanostructured materials for biofuels, batteries, fuel cells, solar cells, supercapacitors and health biosensors. Chapters describe principles and how to choose a nanomaterial for specific applications in energy, environment and medicine.

Multiphase Reactor Engineering for Clean and Low-Carbon Energy Applications

Metal, Metal-Oxides and Metal Sulfides for Batteries, Fuel Cells, Solar Cells, Photocatalysis and Health Sensors

Fuel Cell Technology Handbook

Focus on Catalysis Research