

PERP Program – New Report Alert

May 2005

Nexant's *ChemSystems* Process Evaluation/Research Planning program has published a new report, *Coal Gasification Technologies (03/04S11)*.

Background

Gasification is a high-temperature process usually conducted at elevated pressure that converts any carbon-containing material into a mixture composed primarily of carbon monoxide and hydrogen. Since this gas is often used for the synthesis of chemicals or synthetic hydrocarbon fuels, the gas is referred to as synthesis gas or syngas. The syngas can also be used as a fuel to generate electricity or steam and as a source of hydrogen. Gasification adds value to low- or negative-value feedstocks by converting them to marketable products.

Typical feedstocks to gasification are coal, petroleum-based materials such as crude oil, coke, and high-sulfur residues, gases, and various waste materials. Dry or slurried feedstock is reacted in the gasifier with steam and oxygen in a reducing (oxygen-starved) atmosphere at a high temperature and (usually) high pressure. The resulting syngas typically contains about 85 percent of combined carbon monoxide and hydrogen, with the balance being largely carbon dioxide and methane.

The high temperature in the gasifier converts the inorganic materials in the feedstock, such as ash and metals, into a vitrified material resembling coarse sand in texture and generally referred to as slag. This inert slag has a variety of uses in the construction and building industries.

The raw syngas is treated using proven commercial technologies to remove trace elements or other impurities for recovery or recycle to the gasifier. Sulfur can be recovered as marketable elemental sulfur or sulfuric acid.

If the syngas is to be used to produce electricity, it is typically used as fuel in an integrated gasification combined cycle (IGCC) power generation configuration. The combined cycle system utilizes a high-efficiency gas turbine to burn the clean syngas, with exhaust heat recovered to generate steam for use in a high-efficiency steam turbine. Both the gas turbine and the steam turbine drive electric power generators. A wide range of products, such as fuels, chemicals, fertilizers, and industrial gases, can be produced in lieu of power or in conjunction with power.

Figure 1 depicts a simplified flow chart illustrating alternative utilization options for coal-derived syngas. Various gasification and environmental cleanup technologies convert coal (or other carbon-based feedstocks), oxidant, and water to syngas for further conversion into marketable products: electricity, fuels, chemicals, steam, hydrogen, and others.

Perp Report Coal Gasification Technologies

TD Snyder



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Methanol: The Basic Chemical and Energy Feedstock of the Future Martin Bertau, Heribert Offermanns, Ludolf Plass, Friedrich Schmidt, Hans-Jürgen Wernicke, 2014-02-18 Methanol The Chemical and Energy Feedstock of the Future offers a visionary yet unbiased view of methanol technology Based on the groundbreaking 1986 publication Methanol by Friedrich Asinger this book includes contributions by more than 40 experts from industry and academia The authors and editors provide a comprehensive exposition of methanol chemistry and technology which is useful for a wide variety of scientists working in chemistry and energy related industries as well as academic researchers and even decision makers and organisations concerned with the future of chemical and energy feedstocks Handbook of Industrial Chemistry and Biotechnology James A. Kent, Tilak V. Bommaraju, Scott D. Barnicki, 2017-08-01 This widely respected and frequently consulted reference work provides a wealth of information and guidance on industrial chemistry and biotechnology Industries covered span the spectrum from salt and soda ash to advanced dyes chemistry the nuclear industry the rapidly evolving biotechnology industry and most recently electrochemical energy storage devices and fuel cell science and technology Other topics of surpassing interest to the world at large are covered in chapters on fertilizers and food production pesticide manufacture and use and the principles of sustainable chemical practice referred to as green chemistry Finally considerable space and attention in the Handbook are devoted to the subjects of safety and emergency preparedness It is worth noting that virtually all of the chapters are written by individuals who are embedded in the industries whereof they write so knowledgeably **The Science and Technology of Coal and Coal Utilization** Bernard Cooper, 2013-11-11 Filling the need for new and improved energy sources is an area where societal effects of science and technology will surely increase The editors and authors have attempted in this volume to present the most current work on the science and technology of coal and coal utilization Serious disagreement exists on several key issues such as carbon dioxide release and acid rain At the same time however coal is the world's most abundant fossil fuel and will have to be used to supply the world's energy needs for the next several decades The 1979 National Research Council Report Energy in Transition 1985 2010 has estimated that the United States alone may go from a 1979 coal consumption of 14 QUADS per annum approximately 750 million tons per year to approximately 40 50 QUADS per annum approximately 2 billion tons per year by the year 2010 If this scale of coal utilization is to become a reality a significant level of research and development will be necessary to establish advanced process technologies and to improve related areas such as materials and instrumentation The editors hope that this volume will allow a technically educated person to become aware of the several aspects of coal utilization from characterization of coal itself to the processes of coal utilization B R Cooper and W A Ellingson March 1983 vii Contents 1 THE SCIENCE AND TECHNOLOGY OF COAL AND COAL UTILIZATION 1 Bernard R Cooper and William A Ellingson 2 COAL CHARACTERIZATION *Report summaries* United States. Environmental Protection Agency, 1983 **Annual Report -**

Office of Research and Development, Research Triangle Park, North Carolina United States. Office of Research and Development (Research Triangle Park, N.C.),1974 **Automotive Emission & Alternative Fuel Technology** Mr. Rohit Manglik,2024-07-17 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

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Table of Contents **Perp Report Coal Gasification Technologies**

1. Understanding the eBook **Perp Report Coal Gasification Technologies**
 - The Rise of Digital Reading **Perp Report Coal Gasification Technologies**
 - Advantages of eBooks Over Traditional Books
2. Identifying **Perp Report Coal Gasification Technologies**
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an **Perp Report Coal Gasification Technologies**
 - User-Friendly Interface
4. Exploring eBook Recommendations from **Perp Report Coal Gasification Technologies**
 - Personalized Recommendations
 - **Perp Report Coal Gasification Technologies** User Reviews and Ratings

- Perp Report Coal Gasification Technologies and Bestseller Lists
- 5. Accessing Perp Report Coal Gasification Technologies Free and Paid eBooks
 - Perp Report Coal Gasification Technologies Public Domain eBooks
 - Perp Report Coal Gasification Technologies eBook Subscription Services
 - Perp Report Coal Gasification Technologies Budget-Friendly Options
- 6. Navigating Perp Report Coal Gasification Technologies eBook Formats
 - ePub, PDF, MOBI, and More
 - Perp Report Coal Gasification Technologies Compatibility with Devices
 - Perp Report Coal Gasification Technologies Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Perp Report Coal Gasification Technologies
 - Highlighting and Note-Taking Perp Report Coal Gasification Technologies
 - Interactive Elements Perp Report Coal Gasification Technologies
- 8. Staying Engaged with Perp Report Coal Gasification Technologies
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Perp Report Coal Gasification Technologies
- 9. Balancing eBooks and Physical Books Perp Report Coal Gasification Technologies
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Perp Report Coal Gasification Technologies
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Perp Report Coal Gasification Technologies
 - Setting Reading Goals Perp Report Coal Gasification Technologies
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Perp Report Coal Gasification Technologies
 - Fact-Checking eBook Content of Perp Report Coal Gasification Technologies
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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