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Consumption of Fossil Fuels in a Progressive Manner

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Introduction

American Institute of Chemical Engineers (AIChE) Spring National Meeting Tampa, Florida: Fuels and Petrochemicals Division and Research and New Technology Committee. The removal of mercury and other impurities from coal-derived gas was a major topic of discussion at this conference, along with the production and separation of hydrogen and carbon dioxide. Eight sessions were scheduled, including two on the capture and separation of carbon dioxide, two on emissions and management of mercury and other trace elements in coal, and four on the topic of fuel processing for the creation of hydrogen. Two plenary talks were given in addition to a total of 54 papers being presented. This symposium offered a venue for researchers studying fossil fuels to communicate, share ideas, go over recent developments, and build partnerships. This special issue of Fuel, titled "Advanced Fossil Energy Utilization," has a total of nineteen articles that were presented at the conference. They are split into three categories: Fuel processing for hydrogen production/separation for fuel cell applications,Carbon capture and separation for power generation systems, and Mercury and other trace elements in fuel: Emissions and control.

Description

Although they are not yet commercially viable, fuel cells are a technology that is much sought after on a global scale. For stationary, distributed, and transportation-related energy needs, fuel cells are frequently cited as greener and more effective options. Governmental organisations, academia, and the private sector are all working hard to create fuel cell technology that is both efficient and economical. The fuel processor is a crucial part of this system and must be able to supply the fuel cell stack with a clean, customised synthesis gas for continuous operation. Numerous conventional fuels, including natural gas (methane), propane, butane, light distillates, methanol, ethanol, propanol, dimethyl ether, naphtha, gasoline, diesel, biodiesel, naval distillate fuel (NATO F-76), kerosene, and jet fuels, could be used in reforming processes to produce H2-rich synthesis gas, depending on the application (stationary, central power, remote, auxiliary, transportation, military, Catalyst development, kinetics, non-thermal plasma reforming, membrane reactor for hydrogen production and separation, chemical looping reforming, desulfurization for fuel cleanup, and sorbent-enhanced WGS reaction are all topics covered in research papers in the fuel processing for hydrogen production area. Regarding the technological viability and economics of the entire carbon sequestration concept, the capture/separation phase for carbon dioxide (CO_2) from large-point sources is crucial (capture followed by storage). Techniques for capturing or separating CO_2 from power generation point sources can include capturing it from flue gas (post-combustion), fuel, or synthesis gas (pre-combustion).

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Wet scrubbing and chemical absorption/adsorption with solid sorbents were largely explored as new or enhanced ways of CO_2 capture that can dramatically lower CO_2 collection costs and associated energy needs from existing or advanced power systems. The outcomes of system analyses that measure cost and technical improvements were also a part of the forum. The process of burning fossil fuels with air to create flue gas is most frequently linked to the creation of electricity. A fuel or syngas is produced by modern power generation systems, particularly gasification-based power generators like the Integrated Gasification Combined Cycle (IGCC), which can then be burned in a gas turbine combustor.

In either scenario, gasification or combustion can generate a number of contaminants that must be eliminated in accordance with current legislation or ethical standards. By December 2011, the United States Environmental Protection Agency is supposed to release a nationwide regulation for mercury emissions from coal-burning power plants. In the meanwhile, numerous states are enacting their own rules for utilities that burn coal. In order to use the world's large supplies of coal more efficiently and sustainably, gasification is a key strategy. The high thermal efficiency of IGCC plants is preserved thanks to the high temperature capture of the trace elements mercury, arsenic, and selenium as opposed to the low temperature capture by activated carbons [1-5].

Conclusion

There is a need for low-cost mercury removal methods that can be used in both IGCC and coal-burning power plants because many US states have issued requirements for mercury control. The regulation of the trace elements mercury, arsenic, and selenium in coal-derived gas streams, the destiny of arsenic and selenium in flue and fuel gas, and the on-line detection of mercury were all topics covered in the symposium sessions devoted to this subject. The presenters and participants who made the symposium a success are acknowledged by the writers. We would like to thank David A. Atwood and the other keynote speakers (University of Kentucky), Thank you to Sharon Sjostrom (ADA-ES), Leonard Levin (EPRI), and Alexander Fridman (Drexel University) for their contributions. We would especially like to thank Mark W. Smith of REM Engineering and Daniel J. Haynes of Parsons, Inc. for their assistance during this symposium. Additionally, we would like to extend our sincere gratitude to all reviewers for their well-considered and prompt comments.

Conflict of Interest

None.

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