PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Advanced Research

09/2005

QUANTITATIVE CHAR KINETICS FOR PRESSURIZED GASIFICATION OF COAL

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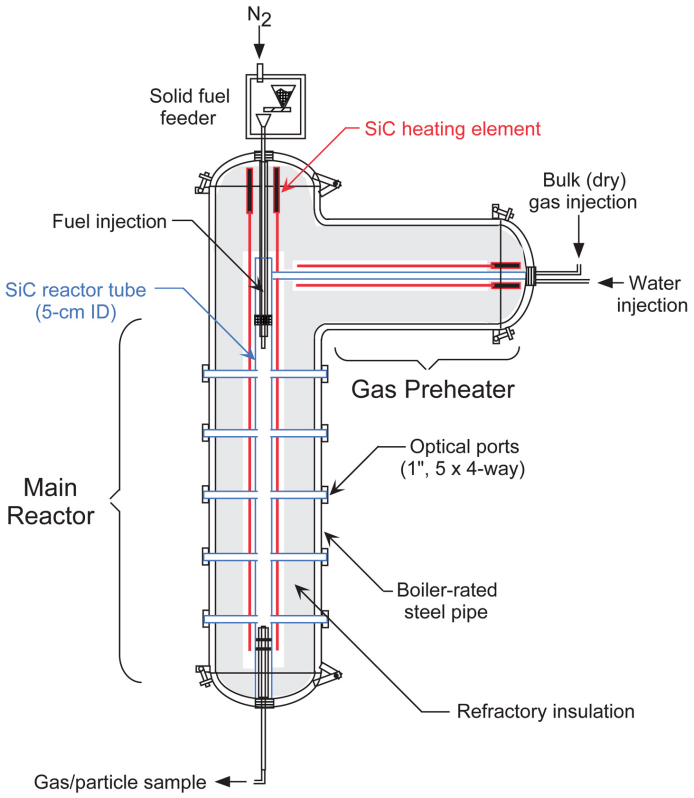
Description

To succeed in achieving the goals of Vision 21, particularly the FutureGen power plant concept producing electrical power and hydrogen from coal with zero-emissions, coal gasifiers must be optimized and designed for increased fuel flexibility. Comprehensive computational fluid dynamics (CFD) modeling of gasifiers offers a promising approach to achieving these goals, but the effectiveness of these gasifier simulations is constrained by the inability to accurately predict the gasification rate of coal char under conditions experienced in the gasifier. In particular, carbon conversion is an inherently limiting factor to gasifier design and operation, and cannot be adequately predicted without accurate gasification kinetic rate information.



Schematic diagram of the Pressurized Combustion and Gasification Reactor (PCGR) for measuring coal char gasification kinetics.

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PROJECT DURATION

October 1, 2004 –
September 30, 2007

PROJECT COST

$550,000

CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

Goals

The goal of this project is to collect measurements of coal char gasification kinetic rates in CO_2 and H_2O under high-temperature, pressurized conditions associated with the most promising gasification technologies for Vision 21 energyplexes. A newly developed laboratory facility known as the Pressurized Combustion and Gasification Reactor (PCGR) will be used for this purpose. Gasification rate parameters are commonly measured at low and intermediate temperatures using thermogravimetric analyzers . However, little data exists at the higher temperatures and pressures associated with slagging gasifiers. These rate parameters are needed to perform accurate modeling of gasifier performance, and to optimize the operation of existing or new gasifier designs. The gasification kinetics will be measured for typical western U.S. subbituminous and eastern U.S. high-volatile bituminous coals.