

PRODUCTION OF SYNGAS BY PRESSURISED FLUIDISED BED GASIFICATION OF GERMAN LIGNITE IN A STEAM/CARBON DIOXIDE ATMOSPHERE

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Abstract:

The oxyfuel gasification concept enables a N₂-free gas to be obtained by fluidised bed gasification (FBG). This process uses CO₂ to moderate the bed temperature and thus avoid ash agglomeration. An alternative cooling medium is steam, which could be employed as a single gasification agent, or in a mixture with CO₂. However, the impact of different steam to CO₂ ratios in the product distribution and operability of the gasifier needs to be investigated.

In this context, the present study focused on the fluidized bed gasification of a German lignite with steam/CO₂ mixtures as a gasification medium under different operating conditions of temperature and pressure. A continuous high-pressure laboratory-scale, fluidised bed reactor was used for evaluating the gasification performance of this fuel. The effect of a gasification agent consisting of different steam to CO₂ ratios at different conditions of temperature (750-950°C), pressure (up to 10bar) and gas to fuel ratio (steam and or CO₂/Fuel) was assessed. By varying the operating conditions, it is expected that the process can be tailored to produce syngas of different compositions, which in turn can be used for different applications ranging from H₂ generation for utilization in solid oxide fuel cells (SOFC) to production of chemicals and conventional power generation.

Keywords: fluidized bed, gasification, coal, syngas, steam, CO₂.

Acknowledgement: The scientific work was partly supported by the Research Fund for Coal and Steel (FECUNDUS project - Grant RFCR-CT-2010-0009).

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