

Coal gasification in the Sotacarbo coal-to-hydrogen experimental plant

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Abstract

Hydrogen production through coal gasification represents a reliable technology characterized by a very low environmental impact. In this field, Sotacarbo has realized a pilot platform for a combined production of hydrogen and electrical energy through fixed-bed air-blown coal gasification (Wellmann-Galusha technology).

This paper reports an analysis, based on the experimental data, of the gasification process (with its consequences in hydrogen production) in different operative conditions; in particular, the effects of air/coal and steam/coal mass ratios have been analyzed (a hydrogen concentration between 20 and 40% has been obtained). The temperature profile into the reactor (which present a maximum value of about 850-900 °C in the combustion and gasification zone) has been reported in different operative conditions, including the startup procedure and a malfunctioning of the plant.

Moreover, the possibility to feed the gasifier with air enriched in oxygen has been evaluated through a simulation model; in this case, a remarkable mass flow reduction (by about 35-40%) and a significant increasing of hydrogen concentration can be achieved by enriching the air up to 40-45% of oxygen.

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