

ABSTRACT

A method and an apparatus for biomass pyrolysis gasification via two interconnected furnaces. The method uses a high heat-capacity solid particle as an energy carrier and saturated water as an oxidizer. First, the biomass is subjected to a low-temperature pyrolysis at a temperature between 500 and 800°C to obtain an alkali metal oxide-free crude synthetic gas and coke. Next, the crude synthetic gas and the coke are subjected to a high-temperature gasification at a temperature between 1200 and 1600°C to obtain a tar-free synthetic gas. Finally, the synthetic gas generated is subjected to a sequence of cooling, dust removal, acid removal, and dehydration processes. The device comprises: a gasification furnace (4) and a pyrolysis furnace (6) arranged one on top of the other, the inner cavities thereof being interconnected, a particle heater (10), a plasma torch heater (11), an exhaust fan (12), and a first heat exchanger (13) cyclically arranged, a water storage container (16) for making the saturated water vapor, a water delivery pump (15), a second heat exchanger (14), a dust remover (17), an acid remover (18), and a dehydration device (19).