

Hydrogen production from chemical-looping steam methane reforming in a circulating fluidized bed reactor

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Steam methane reforming (SMR) process for hydrogen production has many complex reaction steps to purify H₂ so that the capital investment would be high and the process efficiency could be reduced. In this respect, chemical-looping SMR reaction (methane oxidation and steam reduction steps) to improve conventional SMR process is proposed in this study. The continuous hydrogen production with iron oxides as an oxygen carrier was carried out in a circulating fluidized bed reactor (two column reactors, I.D. 81 and 106 mm). In the continuous operation, solid circulation (10–30 g/s) at the given reaction temperature can be maintained the desirable values. Methane conversion increases with solid circulation rate and high purified hydrogen with CO-free can be generated at steady state condition.