

### Autothermal Reforming of Methane to Hydrogen in a Stand-alone Reformer

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Autothermal reforming includes the exothermic partial oxidation and the endothermic steam reforming under thermally neutral conditions. In this work, stand-alone autothermal reformer that is developed as 1kWe scale consists of two distinct zones; a start-up zone and an autothermal reforming zone. In the start-up zone, electrically heated converter(EHC) with partial oxidation catalyst-coated metal monolith helps in heating up the temperature above 700°C within two minutes. Accordingly, the autothermal reforming zone has a temperature between 550°C and 650°C.

Autothermal reforming of methane is carried out at S/C ratio 1~2, O/C ratio 0.4~0.6, and GHSV 10,000~20,000hr<sup>-1</sup>. Under this condition, methane conversion of 91.6%, hydrogen yield of 74.2% on dry basis can be achieved and 1 mol of methane can produce 2.7 mol hydrogen at equilibrium reformer temperature of around 600°C.