



Chemical looping partial oxidation of methane with di-calcium ferrite oxygen carriers in a moving bed reactor

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Abstract: Di-calcium ferrite (DCaF) oxygen carriers were prepared for carrying out chemical looping partial oxidation of methane and refuse derived fuel (RFD) in a moving bed reactor (MBR). In this study, DCaF-1150 oxygen carrier which calcined at 1150°C with iron/calcium mole ratio of 50/50 exhibited good syngas selectivity, recyclability, crush strength and lower attrition. The reduction kinetic analysis was investigated under hydrogen and carbon monoxide atmosphere with the apparent activation energy of reduction were 84.30 kJ/mol and 69.22 kJ/mol, respectively. DCaF-1150 was used in the experiments of methane partial oxidation at various operating temperatures, O/CH₄ ratio, H₂O ratio and CO₂/CH₄. The optimal conditions were determined. The result showed that carbon conversion was approximately 81.63% and syngas concentration was approximately 84.20 mol.% at 900°C with the methane concentration of 30 vol.%, inlet CO₂ flow rate of 0.93 mmol/min.



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