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EXERGY ANALYSIS OF HYDROGEN PRODUCTION VIA BIOMASS STEAM GASIFICATION AND PARTIAL OXIDATION

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Abstract

Hydrogen production via biomass steam gasification and partial oxidation is analyzed from exergy aspect. Based on cypress sawdust gasified from 800°C to 1200°C, the exergy value of H₂ from steam gasification rises from 1410.80 kJ kg⁻¹ to 7922.89 kJ kg⁻¹, while that from partial oxidation increases from 988.30 kJ kg⁻¹ to 3097.81 kJ kg⁻¹. The exergy efficiency of H₂ from biomass also increases for both steam gasification (6.42–36.08%) and partial oxidation (4.50–14.11%). However, the exergy efficiencies of H₂ from syngas are not in accordance. For steam gasification, the exergy efficiency rises sharply from 14.67% to 47.39%, and then increases slightly to 48.90%. For partial oxidation, the efficiency increases from 15.50% to 29.91% first, and then decreases slightly to 28.26%.

Key words: biomass, exergy analysis, hydrogen production, partial oxidation, steam gasification

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