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Hydrogen Production from Algal Biomass via Steam Gasification

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ABSTRACT

Algal biomasses were tested as feedstock for steam gasification in a dual-bed microreactor in a two-stage process. Gasification experiments were carried out in absence and presence of catalyst. The catalysts used were 10% Fe₂O₃ - 90% CeO₂ and red mud (activated and natural forms). Effects of catalysts on tar formation and gasification efficiencies were comparatively investigated. It was observed that the characteristic of algae gasification was dependent on its components and the catalysts used. The main role of the catalyst was reforming of the tar derived from algae pyrolysis, besides enhancing water gas shift reaction. The tar reduction levels were in the range of 80-100 % for seaweeds and of 53 - 70 % for microalgae. Fe₂O₃-CeO₂ was found to be the most effective catalyst. The maximum hydrogen yields obtained were 1036 cc/g algae for *Fucus serratus*, 937 cc/g algae for *Laminaria digitata* and 413 cc/g algae for *Nannochloropsis oculata*.

Keywords: algae, steam gasification, hydrogen, iron catalyst

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