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Process Estimation for Effective Development of Biomass to Liquids Process

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Abstract

In order to accelerate the development of the biomass-to-liquids (BTL) process used to produce Fischer-Tropsch oil (liquid hydrocarbons), the economy and environmental effects of the process were simulated and estimated. The effects of the gas composition in syngas and the carbon conversion to syngas on the yield of liquid hydrocarbons were considered. The effects of heat recovery from syngas and compression on the economy of the system and the environment were investigated. The system simulation and estimation indicated that the gas composition of syngas might strongly affect the yield of liquid hydrocarbons compared to the carbon conversion to syngas. The heat recovery from syngas improved the economy of the system because of the lower energy cost of the heat exchanger. A BTL process that incorporates pressurized gasification and does not require compression might have better economy because of its lower electricity consumption compared with a BTL process that requires compression. In this case, the cost of the pressurized gasifier might be an important factor. That is, the cost should be less than 1.676 times the cost of the atmosphere gasifier. It was found that the process that does not involve compression could mitigate CO₂ emission.

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