Studi Eksperimental Pengaruh Jenis Biomassa Dan Temperatur Reaktor Gasifier Terhadap Kualitas Syngas Hasil Gasifikasi

Prayudi Suparmin[1,], Roswati Nurhasanah[1], Sudirmanto[1]*
[1]Program Studi TeknikMesin Fakultas Teknologi dan Bisnis Energi, IT PLN, Jakarta
Email : prayudi@itpln.ac.id

ABSTRACT

Research to create new and renewable energy is being driven by rising energy demand, the depletion of fossil fuel supplies, and environmental concerns. Biomass is a currently emerging energy source. One of the fuels for external combustion or combustion in the engine is syngas gasification of wood pellets. The issue is that biomass gasification syngas does not match the requirements for dual fuel in diesel engines. This study aims to identify the traits of biomass gasification producer gas and the quality of syngas produced by biomass gasification. The Biomass and Waste Gasification Laboratory, Faculty Technology and Energy Business, Institute Technology PLN, conducts experiments. Before being kept in a reactor, biomass is warmed by sunlight for 4 (four) days.A downdraft capacity of 130–140 kg, an air flow rate of 200 liters per minute, and a gasification temperature range of 750–950 ◦C were all utilised in the reactor. According to the experiment's findings, the oxygen to carbon ratio fell while the calorific value of the feedstock for wood pellets increased. With an LHV of 3.99 MJ/Nm3, a gasification efficiency of 53.52%, and a carbon conversion efficiency of 90.12%, the producer gas position is 21.55% vol CO, 6.25% vol CO2, 1.48% vol CH4, and 7.05% vol H2.

Keywords*: biomass gasification; cold efficiency gasification; carbon conversion efficiency; wood pellets*

ABSTRAK

Peningkatan permintaan sumber energi, menipisnya cadangan energi fosil, dan isyu lingkungan hidup, mendorong penelitian untuk mengembangakan energi baru terbarukan. Salah satu sumber energi yang saat ini kembangkan biomassa. Syngas gasifikasi wood pellets merupakan salah satu bahan bakar pembakaran luar atau pembakaran dalam mesin. Permasalahan adalah kualitas syngas gasifikasi biomassa belum memenuhi standar bahan bakar dual fuel mesin diesel. Tujuan dalam penelitian ini adalah mengetahui karakteristik gas produser gasifikasi biomassa dan kualitas syngas gasifikasi biomassa. Ekperimen di Laboratorium Gasifikasi Biomassa dan Sampah Fakultas Teknologi dan Bisnis Energi Institut Teknologi PLN. Biomassa sembelum dipamsukan dalam reactor dipanaskan dengan sinar matahari selama 4 (empat) hari. Reaktor yang digunakan downdraft kapasitas 130-140 kg, laju udara 200 liter per menit, dan temperature gasifikasi antara 750◦C menjadi 950 ◦C. Hasil ekperimen diperoleh rasio oksigen terhadap carbon menurun, nilai kalor feedstock wood pellets meningkat. Komposisi gas produsernya 21.55% vol CO, 6.25%vol CO2, 1.48%vol CH4 dan 7.05% vol H2, LHV 3.99 MJ/Nm3, efisiensi gasifikasi 53.52%, efisiensi konversi karbon 90.12%.