Ooptimization of fixed bed downdraft reactor for rice husk biomass gasification using secondary air intake variation

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Abstrak

Rice husk is one of the most abundant agricultural wastes in Indonesia, with an annual potency of 13,662 MWe. Using biomass gasification, it can be converted into producer gas, whose energy can be used for thermal and electrical power generation. In gasification terms, gas quality can be interpreted by tar content and gas energy. An experiment using an open top fixed bed downdraft gasifier (batch system) with double stage air supply was conducted by varying the secondary air injection position (Z) and the air ratio (AR). Tar content can be represented by flaming pyrolysis duration and gas quality by the combustion energy of the gas. Flaming pyrolysis is a phenomenon which occurs inside the reactor, where tar produced is re-cracked and dissolved into smaller compounds. This can be achieved if the pyrolysis zone temperature ranges between 500 and 800oC. With an AR of 80%, at Z = 38 cm, flaming pyrolysis with the longest duration of 400 seconds was created, which indicated that this condition had the lowest tar content; meanwhile, at Z = 50 cm, gas with the highest energy (734.64 kJ) was obtained.