ABSTRACT

Population increase of a country causes an increase in protein needs, including animal protein. As a result, the increased waste from livestock manure also increased. One way to handle livestock waste effectively and efficiently is to convert manure into syngas through gasification. Gasification is a process that converts solid raw materials to syngas. Syngas can be utilized as fuel for new energy sources. Therefore, gasification prestudy is necessary to maximize syngas production. Updraft gasification is used in this study.

In this study has been done a simulation method through modeling of Computational Fluid Dynamics (CFD) using ANSYS Student Version 2019 R2 software. The simulation is by observing chicken and cow manure characteristics as feedstock at a combustion temperature of 953K (680℃) dan 1273K (1000℃). Besides, this simulation is also done by observing the effect of air velocity at a speed of 0.0025 m/s, 1 m/s, 2 m/s, and 4 m/s.

The updraft gasification simulation produces various types of syngas. From the syngas variations, only CO, H_2, CH_4, and CO_2 are observed as fuels for new energy sources. CO gas is mostly produced if gasification is done using chicken manure, with an air flow rate at a speed of 2 m/s and a temperature of 953K (680℃). The most H_2 gas was produced when cow dung is used at an airflow rate of 2 m/s and 1273K (1000 ℃). Most CH_4 gas is produced using chicken manure at an air flow rate of 1 m/s with 1273K (1000 ℃). Meanwhile most CO_2 gas uses chicken manure at an air flow rate of 1 m/s with a temperature of 1273K (1000℃). From this simulation it is known that chicken manure and cow manure can become feedstock for gasification. This simulation is also expected to help optimize the updraft gasification system.

Keywords: ANSYS student version 2019 R2, CFD, simulation, syngas, updraft gasification.