ABSTRACT

In the development of renewable energy, biomass is one source that has high potential to be developed. From these materials, some useful gases such as hydrogen are produced. Hydrogen is one of the alternative energy options because it is easily converted and does not damage the environment either in the process of manufacture or use.

The method used in this research is anaerobic fermentation process. In this process do not use additional bacteria, or enzyme, just doing pre-treatment stage with substrate of stale bread 370 gram, 100 gram sugar, and water 1000 mL, then substrate kept in open for 2 days. After that, heating the substrate for 15 minutes to assist the decomposition process of complex compounds into organic acids and inhibit methanogenic bacteria that consume hydrogen. During the process the temperature will be kept constant under mesophilic conditions with temperatures of 25˚C, 28˚C, 31˚C, 34˚C and 37˚C. The tool used in this research is anaerobic diesel made of glass with high dimension 23 cm, diameter of 11 cm.

Based on the research results, the production of hydrogen gas can be obtained at mesophilic temperature with anaerobic fermentation. Volume of hydrogen gas from each temperature is 0.02 mL, 0.79 mL, 17.65 mL, 25.92 mL, and 38.4 mL.

keywords: biomass, hydrogen, anaerobic fermentation, mesophilic temperature, stale bread's substrate, anaerobic digester.