The using of fossil fuels cause an environmental pollution. Burning fossil fuels produces gases that are harmful to the environment and cause global warming. It is necessary to find a substitute fuel. The potential energy that replace fossil fuels is hydrogen because hydrogen combustion only produces water vapor. One source of raw materials used for hydrogen production by fermentation is rice straw. Each year, Indonesia produced dry rice straw waste 180 million tons. Cellulose and hemicellulose are present in rice straw can be converted into glucose and xylose by hydrolysis process which can be fermented into hydrogen. The aims of this study is to determine the effect of glucose concentration and temperature on hydrogen production quantitatively. After that we can be found kinetic parameters. It is useful for design and control of fermentation. In this study the fermentation of synthetic straw hydrolysates containing glucose and xylose ratio of 1.5:1. Hydrogen fermentation by Enterobacter aerogenes conducted in four parallel batch reactors with the volume of each reactor 500 mL. The reactor equipped with a heater and stirrer. Fermentation temperature varied from 30, 40, 50 oC. Substrates containing variable glucose 0.5, 1, 2, 3, 4% w/v yeast extract with the addition of 0.5% and FeSO4.7H2O 0.35 g/L. Fermented solution is maintained at a pH of 5.5 to 6 using 4M NaOH. The results of this study indicate $\mu_{\text{max}}$ 1.67 jam, $K_s$ 72 g/L dan $K_i$ 24 g/L for growing cell and kinetic parameter for rate of hydrogen indicate $r_{\text{max}}$ 8.33 mmol/jam, $K_s$ 1.74 mmol/jam dan $K_i$ 5.22 mmol/jam.

Key words: Hydrogen, Enterobacter aerogenes, anaerobic fermentation, reaction kinetics