ABSTRAK

PENGARUH VARIASI WAKTU TERHADAP PROSES HIDROLISIS ENZIM SELULASE PADA *EMPTY FRUIT BUNCH* MENJADI SIRUP GLUKOSA

(Tesya Rizkyani, 2025, 44 Halaman, 9 Tabel, 7 Gambar, 4 lampiran)

Telah dilakukan pembuatan glukosa dari limbah *fiber cake* menjadi glukosa yang mana nantinya akan lebih berguna sebagai bahan baku untuk suatu produk. Penelitian ini terdiri dari tiga tahapan yaitu: tahapan persiapan bahan baku, delignifikasi dan hidrolisis (sakarifikasi). bahan baku. Metode delignifikasi adalah proses pemisahan selulosa, lignin, dan hemiselulosa dilakukan dengan menggunakan H_2O_2 dan penambahan katalis $MnSO_4.H_2O$ pada alat reflux suhu 36°C. Penelitian ini bertujuan untuk memusatkan konsentrasi enzim selulase dalam proses hidrolisis (sakarifikasi) untuk menentukan kadar glukosa tertinggi. Variasi dalam penelitian ini adalah konsentrasi enzim selulase sebesar 10, 20, 30 (%) dari berat serat EFB. Pengujian yang dilakukan adalah kadar pengujian selulosa, hemiselulosa, lignin dan kadar glukosa. Percobaan dilakukan pada suhu 50°C. Pengambilan sampel terjadi setiap 6, 12, 18, dan 24 jam. Hasil Penelitian menunjukan bahwa pengaruh variasi waktu terhadap konsentrasi kadar sirup glukosa pada konsentrasi enzim selulase tertinggi yaitu % sirup glukosa sebesar 15,25%. Hidrolisis *fiber cake* yang dilakukan secara enzimatis telah berhasil dilakukan dengan ditemukannya kadar glukosa dari hasil hidrolisis limbah *fiber cake*. Berdasarkan pengamatan semakin lama waktu hidrolisis maka semakin besar pula kadar glukosa yang dihasilkan. Delignifikasi pada alat reflux yang dilakukan pada suhu 70-80ºC dapat menurunkan komposisi lignin *fiber cake* sawit yang tidak hanya dipengaruhi oleh H_2O_2 tetapi juga katalis $MnSO_4.H_2O$. Komposisi lignin *fiber cake* sawit terdelignifikasi yaitu (17 %) terdapat pada kondisi operasi delignifikasi 4 jam pada suhu 80ºC.

Kata Kunci; Limbah Padat Kelapa Sawit, *Fiber cake*, Hidrolisis (Sakarifikasi), Selulase, H_2O_2, katalis $MnSO_4.H_2O$.

ABSTRACT

THE EFFECT OF TIME VARIATION ON THE HYDROLISIS PROCESS USING CELLULOSE ENZYME TO CONVERT EMPTY FRUIT BUNCH INTO GLUCOSE SYRUP

(Tesya Rizkyani, 2025, 44 Pages, 9 Tables, 7 Figures, 4 Appendices)

The production of glucose from fiber cake waste has been carried out to create a more valuable raw material for further product development. This research consists of three main stages: raw material preparation, delignification, and hydrolysis (saccharification). The delignification process, which separates cellulose, lignin, and hemicellulose, was conducted using H_2O_2 with the addition of $MnSO_4 \cdot H_2O$ as a catalyst in a reflux apparatus at 36°C. The aim of this study is to optimize the concentration of cellulase enzyme during the hydrolysis (saccharification) process to achieve the highest glucose yield. The variations used in this study were cellulase enzyme concentrations of 10, 20, and 30 (%) of the EFB fiber weight. The parameters tested included the contents of cellulose, hemicellulose, lignin, and glucose. The experiments were carried out at a temperature of 50°C, and samples were taken at intervals of 6, 12, 18, and 24 hours. The research results showed that the effect of time variation on the concentration of glucose syrup at the highest cellulase enzyme concentration resulted in a glucose syrup yield of 15.25%. The enzymatic hydrolysis of fiber cake was successfully carried out, as evidenced by the glucose content obtained from the hydrolysis of fiber cake waste. Based on observations, the longer the hydrolysis time, the greater the amount of glucose produced. Delignification using a reflux apparatus at a temperature of 70–80°C was able to reduce the lignin composition in palm oil fiber cake, which was influenced not only by H_2O_2 but also by the $MnSO_4 \cdot H_2O$ catalyst. The lignin content of the delignified palm oil fiber cake was found to be 17% under delignification conditions of 4 hours at 80°C.

Keywords: Oil Palm Solid Waste, Fiber Cake, Hydrolysis (Saccharification), Cellulase, H_2O_2, $MnSO_4.H_2O$ Catalyst.