

ABSTRACT

ANALYSIS OF ETHANOL CONTENT FROM OIL PALM FRUIT FIBER WASTE BASED ON FERMENTATION TIME VARIATION AND DISTILLATION PROCESS

(M Dwi Medriansyah, 2025, *Thesis Report*, 42 Pages, 11 Tables, 13 Figures)

The increasing demand for energy and the commitment to developing renewable energy sources have encouraged the utilization of biomass as an alternative raw material, one of which is bioethanol. This study aims to produce bioethanol from oil palm fruit fiber waste through hydrolysis, fermentation, and purification using distillation. Variations in fermentation time (2, 4, and 6 days) and distillation temperatures (65°C, 70°C, and 75°C) were applied to determine the optimum conditions for producing ethanol with high concentration and purity. The results showed that the highest ethanol content (35%) was obtained on the 4th day of fermentation. Optimal distillation occurred at a temperature of 75°C, resulting in an ethanol content of 78%. The bioethanol characteristics test based on SNI 06-3565:2021 showed that the pH value (7), water content (0.78%), and density (0.772 g/mL) met national standards. Based on GC-MS analysis, ethanol was identified as the main compound. This study demonstrates that oil palm fruit fiber waste has potential as an efficient and environmentally friendly bioethanol feedstock.

Keywords : Bioethanol, Oil Palm Fruit, Fermentation, Distillation.

ABSTRAK

ANALISIS KADAR ETANOL DARI LIMBAH SERAT BUAH KELAPA SAWIT BERDASARKAN VARIASI WAKTU FERMENTASI DAN PROSES DISTILASI

(M Dwi Medriansyah, 2025, Laporan Skripsi, 42 Halaman, 11 Tabel, 13 Gambar)

Meningkatnya kebutuhan energi serta komitmen terhadap pengembangan sumber energi terbarukan mendorong pemanfaatan biomassa sebagai bahan baku alternatif, salah satunya bioetanol. Penelitian ini bertujuan untuk menghasilkan bioetanol dari limbah serat buah kelapa sawit melalui proses hidrolisis, fermentasi, dan pemurnian menggunakan distilasi. Variasi waktu fermentasi (2, 4, dan 6 hari) serta variasi temperatur distilasi (65°C, 70°C, dan 75°C) digunakan untuk menentukan kondisi optimum dalam menghasilkan etanol dengan kadar dan kemurnian tinggi. Hasil penelitian menunjukkan bahwa kadar etanol tertinggi (35%) diperoleh pada hari ke-4 fermentasi. Proses distilasi optimal terjadi pada suhu 75°C, dengan kadar etanol hasil distilasi mencapai 78%. Uji karakteristik bioetanol berdasarkan SNI 06-3565:2021 menunjukkan bahwa nilai pH (7), kadar air (0,78%), dan densitas (0,772 g/mL) telah memenuhi standar nasional. Berdasarkan analisis GC-MS, etanol teridentifikasi sebagai senyawa utama. Penelitian ini membuktikan bahwa limbah serat buah kelapa sawit berpotensi sebagai bahan baku bioetanol yang efisien dan ramah lingkungan.

Kata Kunci : Bioetanol, Buah Kelapa Sawit, Fermentasi, Distilasi.