ABSTRAK

PENGARUH UKURAN KARBON AKTIF DAN KONSENTRASI ELEKTROLIT NaOH TERHADAP BIOBATERAI BERBASIS CANGKANG KELAPA SAWIT

(Ronald Fatah, 2026. Laporan Skripsi ; 85 Halaman, 17 Tabel, 24 Gambar, 3 Lampiran)

Baterai merupakan yang mampu mengubah energi kimia menjadi energi listrik melalui reaksi reduksi dan oksidasi elektrokimia. Penelitian ini bertujuan untuk memanfaatkan limbah berupa cangkang kelapa sawit sebagai bahan baku karbon aktif untuk elektroda baterai, dan menganalisis pengaruh ukuran karbon aktif sebesar 60, 170 dan 200 mesh dan varriasi konsentrasi elektrolit NaOH 0,5 M; 1 M; 1,5 M; 2 M; 2,5 M. Karbon aktif diperoleh melalui proses karbonisasi dan aktivasi kimia menggunakan HNO_3, kemudian dikarakterisasi melalui uji proksimat dan bilangan iodin. Karbon aktif selanjutnya digunakan sebagai media penyimpan elektrolit, dengan menggunakan NaOH, guna menguji performa arus, tegangan, serta daya listrik yang dihasilkan. Hasil penelitian menunjukkan bahwa variasi ukuran karbon dan variasi konsentrasi elektrolit berpengaruh terhadap performa yang dihasilkan biobaterai. Karbon aktif dengan ukuran 200 mesh dan konsentrasi elektrolit NaOH menghasilkan performa yang optimal, dengan tegangan sebesar 3,40 V, arus 5,28 A dan daya maksimum 17,952 W. Semakin halus ukuran karbon aktif dan semakin tinggi konsentrasi elektrolit, menyebabkan semakin besar daya yang dihasilkan. Penelitian ini menunjukkan potensi besar cangkang kelapa sawit sebagai bahan baku baterai ramah lingkungan dan mendukung pengurangan ketergantungan terhadap material logam berat.

Kata Kunci: biobaterai, karbon aktif, cangkang kelapa sawit, NaOH, Fe_3O_4.

ABSTRACT

THE EFFECT OF ACTIVATED CARBON PARTICLE SIZE AND NAOH ELECTROLYTE CONCENTRATION ON PALM KERNEL SHELL-BASED BIO-BATTERIES

(Ronald Fatah, 2026. *Thesis Report* ; 85 *Pages*, 17 *Tables*, 24 *Pictures*, 3 *Appendixes*)

A battery is a device capable of converting chemical energy into electrical energy through electrochemical oxidation-reduction (redox) reactions. This study aims to utilize oil palm shell waste as a raw material for activated carbon used as battery electrodes and to analyze the effect of activated carbon particle sizes of 60, 170, and 200 mesh, as well as variations in NaOH electrolyte concentrations of 0.5 M, 1 M, 1.5 M, 2 M, and 2.5 M. The activated carbon was produced through carbonization followed by chemical activation using HNO_3 and was characterized by proximate analysis and iodine number testing. The activated carbon was then used as an electrolyte storage medium with NaOH electrolyte to evaluate the battery's voltage, current, and power output. The results indicate that both activated carbon particle size and electrolyte concentration significantly affect the performance of the biobattery. The best performance was achieved using 200-mesh activated carbon with a 2.5 M NaOH electrolyte concentration, producing a voltage of 3.40 V, a current of 5.28 A, and a maximum power output of 17.952 W. Finer activated carbon particle sizes and higher electrolyte concentrations resulted in greater power output. These findings demonstrate the considerable potential of oil palm shell waste as a raw material for environmentally friendly batteries and support efforts to reduce dependence on heavy metal-based battery materials.

Keywords: *biobattery, activated carbon, oil palm shell, NaOH, Fe_3O_4*