ABSTRAK

PENGARUH JENIS ANODA DAN KONSENTRASI ELEKTROLIT TERHADAP KINERJA BATERAI SEL KERING BERBASIS *CHAR* PIROLISIS BATUBARA

(Rika Antika, 2026, Laporan Tugas Akhir, 86 Halaman, 12 Tabel, 14 Gambar)

Penelitian ini bertujuan untuk menganalisis pengaruh jenis anoda terhadap kinerja baterai sel kering berbasis *char* pirolisis batubara subbituminus. *Char* diperoleh melalui proses pirolisis pada temperatur 500 °C dan diaktivasi menggunakan larutan NaOH. Karakterisasi *char* meliputi analisis rendemen, kadar air, kadar abu, *volatile matter*, *fixed carbon*, dan bilangan iodin. Baterai dibuat menggunakan *char* sebagai material elektroda dengan variasi anoda aluminium (Al), seng (Zn), dan besi (Fe), sedangkan katoda menggunakan tembaga (Cu). Kinerja baterai dievaluasi berdasarkan parameter tegangan, arus, dan daya pada variasi konsentrasi elektrolit NaOH 0,5 M, 1 M, dan 1,5 M. Hasil karakterisasi menunjukkan bahwa char memiliki rendemen sebesar 52,56%, kadar air 1,64%, *fixed carbon* 71,92%, dan bilangan iodin 1466,04 mg/g, yang menunjukkan karakteristik material karbon yang baik sebagai elektroda. Hasil pengujian baterai menunjukkan bahwa peningkatan konsentrasi elektrolit meningkatkan nilai tegangan, arus, dan daya pada seluruh variasi anoda. Kinerja terbaik diperoleh pada pasangan elektroda Cu–Zn dengan elektrolit NaOH 1,5 M, menghasilkan tegangan sebesar 1,486 V, arus sebesar 0,00708 A, dan daya sebesar 0,0105 W. Berdasarkan hasil tersebut dapat disimpulkan bahwa jenis anoda berpengaruh terhadap kinerja baterai berbasis char pirolisis batubara, dengan urutan performa Zn > Al > Fe.

Kata kunci: batubara subbituminus, *char* pirolisis, baterai sel kering, jenis anoda, kinerja baterai.

ABSTRACT

EFFECT OF ANODE MATERIAL AND ELECTROLYTE CONCENTRATION ON THE PERFORMANCE OF DRY-CELL BATTERIES BASED ON COAL PYROLYSIS CHAR

(Rika Antika, 2026, Final Project, 86 Pages, 12 Tables, 14 Figures)

This study aimed to analyze the effect of anode material on the performance of dry-cell batteries based on sub-bituminous coal pyrolysis char. The char was produced through pyrolysis at 500°C and chemically activated using NaOH solution. Char characterization included yield, moisture content, ash content, volatile matter, fixed carbon, and iodine number analyses. Dry-cell batteries were fabricated using the activated char as the electrode material with aluminum (Al), zinc (Zn), and iron (Fe) as anode materials, while copper (Cu) was used as the cathode. Battery performance was evaluated based on voltage, current, and power output at NaOH electrolyte concentrations of 0.5 M, 1.0 M, and 1.5 M. The characterization results showed that the produced char had a 52.56% yield, 1.64% moisture content, 71.92% fixed carbon, and an iodine number of 1466.04 mg/g, indicating favorable characteristics for electrode applications. Battery testing demonstrated that increasing the electrolyte concentration enhanced the voltage, current, and power output for all anode variations. The best performance was achieved by the Cu–Zn electrode pair with 1.5 M NaOH electrolyte, producing a voltage of 1.486 V, a current of 0.00708 A, and a power output of 0.0105 W. These results indicate that the anode material significantly influences the performance of coal pyrolysis char-based dry-cell batteries, with the performance order of Zn > Al > Fe.

Keywords: *sub-bituminous coal, pyrolysis char, dry-cell battery, anode material, battery performance.*