

ABSTRAK

**STUDI PEMANFAATAN *CHAR* PIROLISIS BATUBARA
KUALITAS RENDAH SEBAGAI BAHAN BAKU PEMBUATAN
BATERAI**

(Amalia Putri, 2025. 47 Halaman, 9 Tabel dan 18 Gambar)

Batubara merupakan sumber energi terbesar di Indonesia dengan total cadangan mencapai 38,84 miliar ton, di mana sekitar 68% di antaranya tergolong batubara peringkat rendah (low-rank coal). Penelitian ini bertujuan untuk meningkatkan kualitas batubara melalui proses pirolisis serta mengembangkan teknologi baterai berbasis *char* hasil pirolisis batubara. Fokus utama penelitian mencakup analisis pengaruh temperatur pirolisis terhadap karakteristik *char*, serta pengaruh konsentrasi larutan aktivator NaOH dan elektrolit KOH terhadap performa daya listrik baterai yang dihasilkan. Hasil penelitian menunjukkan bahwa pirolisis pada temperatur 500°C dengan larutan aktivator NaOH berkonsentrasi 0,5 M hingga 1,5 M menghasilkan nilai *iodine number* tertinggi, yaitu dalam rentang 1.332,765 mg/g hingga 1.532,680 mg/g. Performa baterai terbaik diperoleh pada penggunaan aktivator NaOH 1,5 M dan elektrolit KOH dengan konsentrasi 0,5 M hingga 1,5 M, yang mampu menghasilkan tegangan antara 1,441 V hingga 1,467 V, arus 0,00429 A hingga 0,00841 A, serta daya listrik 0,01174 Watt hingga 0,01234 Watt yang menunjukkan porositas dan luas permukaan *char* yang optimal sehingga mendapatkan hasil baterai terbaik.

Kata Kunci : Batubara, Pirolisis, *Char*, Elektrolit, Aktivasi dan Baterai.

ABSTRACT

STUDY ON THE UTILIZATION OF LOW-RANK COAL PYROLYSIS CHAR AS MATERIAL FOR BATTERY MANUFACTURING

(Amalia Putri, 2025. 47 Pages, 9 Tables and 18 Figures)

Coal is the largest energy source in Indonesia, with total reserves reaching 38,84 billion tons, approximately 68% of which is classified as low-rank coal. This study aims to improve coal quality through the pyrolysis process and to develop battery technology based on char derived from pyrolyzed coal. The main focus of the research includes analyzing the effect of pyrolysis temperature on char characteristics, as well as the influence of NaOH activator solution and KOH electrolyte concentrations on the electrical performance of the resulting battery. The results show that pyrolysis at a temperature of 500°C with NaOH activator concentrations ranging from 0,5 M to 1,5 M produces the highest iodine number values, ranging from 1.332,765 mg/g to 1.532,680 mg/g. The best battery performance was achieved using a 1.5 M NaOH activator and KOH electrolyte concentrations ranging from 0,5 M and 1,5 M, resulting in a voltage range of 1,441 V to 1,467 V, current range of 0,00429 A to 0,00841 A, and power output ranging from 0,01174 Watts to 0,01234 Watts. These results indicate that the char produced under these conditions had optimal porosity and surface area, contributing to superior battery performance.

Keywords: Coal, Pyrolysis, Char, Electrolyte, Activation, Battery.