

ABSTRACT

TECHNOLOGY CONVERSION OF BAMBOO WASTE FOR BIOCHAR PRODUCTION THROUGH PYROLYSIS PROCESS AND ITS APPLICATION FOR REMOVAL OF HEAVY METAL

Much. Taufik Ardani
NIM : 422021621010

Indonesia has a diverse and abundant biomass resource, such as bamboo, which has the potential to be an energy source. However, optimal utilization requires the right conversion techniques. This study examines the conversion of bamboo using pyrolysis at temperatures of 300 °C, 400 °C, and 600 °C, as well as biochar analysis using FTIR, SEM-EDX, and BET. The pyrolysis results show that the yield of biochar decreases as the pyrolysis temperature increases, while the yield of bio-oil increases up to a certain temperature before eventually decreasing due to further conversion into synthetic gas. The analysis of biochar characteristics shows that the largest surface area was found at a temperature of 400 °C with an area of 178.559 m²/g, while the largest diameter was obtained at a temperature of 600 °C, which is 2.4478 nm. The chemical composition of biochar at 400 °C has the highest carbon content at 93.73% and the lowest oxygen content at 5.06%. The adsorption test of biochar on lead (Pb) heavy metal showed that biochar at 600 °C had the best adsorption capacity, with the smallest wavelength in the metal solution being 0.0903 nm.

Key word: Pyrolysis, biochar, heavy metal, bamboo waste

UNIVERSITAS DARUSSALAM GONTOR

ABSTRAK

TEKNOLOGI KONVERSI LIMBAH BAMBU MENJADI BIOCHAR MELALUI PROSES PIROLISIS DAN APLIKASINYA DALAM PENURUNAN LOGAM BERAT

Much. Taufik Ardani

NIM : 422021621010

Indonesia memiliki sumber biomassa yang beragam dan melimpah, seperti bambu, yang berpotensi sebagai sumber energi. Namun, pemanfaatan optimal memerlukan teknik konversi yang tepat. Penelitian ini mengkaji konversi bambu menggunakan pirolisis pada suhu 300 °C, 400 °C, dan 600 °C, serta analisis biochar menggunakan FTIR, SEM-EDX, dan BET. Hasil pirolisis menunjukkan bahwa rendemen biochar akan menurun seiring dengan meningkatnya suhu pirolisis, sebaliknya bio-oil akan meningkat hingga pada suhu tertentu sebelum akhirnya menurun dikarenakan adanya konversi lanjutan menjadi sintetis gas. Hasil analisis karakteristik biochar menunjukkan bahwa luas permukaan terbesar ditemukan pada suhu 400 °C dengan luas 178.559 m²/g sementara diameter terbesar didapat pada suhu 600 °C yaitu 2.4478 nm. Komposisi kimia biochar pada suhu 400 °C memiliki kandungan karbon tertinggi 93.73% dan kadar oksigen terendah 5.06%. Uji daya serap biochar terhadap logam berat timbal (Pb) menunjukkan biochar pada suhu 600 °C memiliki daya serap terbaik, dengan panjang gelombang terkecil pada larutan logam yaitu 0.0903 nm.

Kata Kunci: Pirolisis, biochar, logam berat, limbah Bambu