

ABSTRAK

PENGARUH SUHU DAN DURASI TOREFAKSI TERHADAP SIFAT ENERGI PELET KAYU KARET (*Hevea brasiliensis*) DAN PELET BAMBU BETUNG (*Dendrocalamus asper*) SEBAGAI ALTERNATIF BIOENERGI

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Pada penelitian ini, pelet kayu karet dan pelet bambu betung ditorefaksi menggunakan variasi suhu 200°C, 250°C, dan 300°C dengan durasi 20, 30, dan 40 menit. Pelet biomassa hasil torefaksi dianalisis untuk mengetahui sifat fisis, nilai proksimat, nilai kalor, gugus fungsi, serta struktur kristal. Torefaksi memberikan pengaruh yang signifikan terhadap karakteristik pelet biomassa, seperti penurunan kerapatan sebesar 1,27 g/cm³ dan 1,29 g/cm³ menjadi 1,05 g/cm³ dan 1,03 g/cm³ setelah ditorefaksi. Pelet biomassa hasil torefaksi memberikan penurunan kadar air pada pelet biomassa kontrol sebesar 9,51% dan 9,23%, nilai kadar air pada pelet kayu karet menjadi 1,72% dan kadar air pelet bambu betung 1,92%. Pelet biomassa hasil torefaksi memberikan peningkatan pada analisis proksimat dan nilai kalor. Pada uji ketahanan air, pelet torefaksi suhu 300°C tidak mengalami perubahan fisik setelah perendaman selama 24 jam. Perubahan warna (ΔE^*) pelet kayu karet dan pelet bambu betung yang berubah total menjadi berwarna hitam pada suhu 300°C. Torefaksi menyebabkan perubahan gugus fungsi seperti gugus OH, C-H, C=O, C-O, dan C-O-C dengan analisis FTIR. Torefaksi mengubah struktur kristal pada pelet biomassa kontrol menjadi amorf setelah ditorefaksi.

Kata kunci: Torefaksi, Biomassa, Bioenergi, Pelet Hitam.

ABSTRACT

THE INFLUENCE OF TEMPERATURE AND DURATION OF TORREFACTION ON THE ENERGY PROPERTIES OF RUBBERWOOD PELLETS (*Hevea brasiliensis*) AND BETUNG BAMBOO PELLETS (*Dendrocalamus asper*) AS BIOENERGY ALTERNATIVE

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In this study, rubberwood pellets and betung bamboo pellets were torrefied using temperature variations of 200°C, 250°C, and 300°C with durations of 20, 30, and 40 minutes. The torrefied biomass pellets were analyzed to determine their physical properties, proximate value, calorific value, functional groups, and crystal structure. Torrefaction has a significant impact on the characteristics of biomass pellets, such as a reduction in density to 1.05 g/cm³ and 1.03 g/cm³ after torrefaction. The torrefied biomass pellets showed a reduction in moisture content compared to the control biomass pellets, with the moisture content of rubberwood pellets being 1.72% and the moisture content of betung bamboo pellets being 1.92%. The torrefied biomass pellets show an improvement in proximate analysis and calorific value. In the water resistance test, the 300°C torrefied pellets did not undergo any physical changes after being submerged for 24 hours. The color change (ΔE^*) of rubberwood pellets and betung bamboo pellets completely turned black at 300°C. Torrefaction causes changes in functional groups such as OH, C-H, C=O, C-O, and C-O-C with FTIR analysis. Torrefaction changes the crystal structure of the control biomass pellets to amorphous after torrefaction.

Key words: Torrefaction, Biomass, Bioenergy, Black Pellet.