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PAPER – SAWDUST COMPOSITES: FABRICATION AND COMPARISON IN TERMS OF HEAT TRANSFER AND STRENGTH PROPERTIES

KOMPOZYTY PAPIEROWO-TROCINOWE: WYTWARZANIE I PORÓWNANIE WŁAŚCIWOŚCI CIEPLNYCH I WYTRZYMAŁOŚCIOWYCH

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Abstract

This study was designed to examine the feasibility of recycling cassava effluent, sawdust, and unused paper products to enhance their utilization for beneficial purpose. Waste newspaper paste (WNP), Waste writing – paper paste (WWP), and Waste carton paper paste (WCP) were prepared and then used separately to similarly fabricate composite panels with Sawdust particle (SDP) proportioned at 0%, 25%, 50%, 75%, and 100% by weight. The binder used was cassava starch slurry prepared from the effluent. Bulk density, water absorption, thermal conductivity, specific heat capacity, thermal diffusivity, nailability, and flexural strength were determined for the developed samples. From the results obtained, the samples were found to be light-weight and their thermal insulation performance improved with increasing proportions of the SDP. Though samples containing the WCP exhibited the best satisfactory performance, it was found that all the studied samples could perform more effectively and efficiently as ceilings compared to some of those reported in the literature. From scientific-economic viewpoint, valorizing the above-mentioned wastes as described in this paper could help to protect the environment and also yield value-added insulation ceilings for enhancement of sustainable building construction especially in tropical areas.

Keywords: Cassava Effluent, Ceiling, Flexural strength, Nailability, Thermal conductivity, Water absorption

Streszczenie

Celem pracy było określenie możliwości recyklingu ścieków z manioku, trocin i odpadowych materiałów papierniczych w celu ich szerszego wykorzystania. Nitki z makulatury gazetowej (WNP), nitki z makulatury z papieru do pisania (WWP) i nitki z makulatury z kartonu (WCP) zostały przygotowane, a następnie użyte osobno do wytworzenia paneli kompozytowych z dodatkiem trocin (SDP) przy udziale masowym 0%, 25%, 50 %, 75% i 100%. Zastosowanym spoiwem była przygotowana z odcieku zawiesina skrobi z manioku. Dla przygotowanych próbek określono gęstość nasypową, nasiąkliwość, przewodność cieplną, ciepło właściwe, dyfuzyjność cieplną, zdolność do wbijania gwoździ i wytrzymałość na zginanie. Na podstawie uzyskanych wyników stwierdzono, że próbki miały małą gęstość objętościową, a ich właściwości termoizolacyjne poprawiały się wraz ze wzrostem udziału trocin (SDP). Chociaż próbki zawierające WCP wykazywały najlepsze właściwości, stwierdzono,

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że z wszystkich badanych próbek można wytworzyć sufity o lepszych właściwościach w porównaniu z podobnymi opisanymi w literaturze. Z naukowo-ekonomicznego punktu widzenia zastosowanie wyżej wymienionych odpadów, jak opisano w tym artykule, może pomóc w ochronie środowiska, a także w uzyskaniu bardziej ciepłochronnych stropów, a co za tym idzie przyczyni się do rozwoju bardziej zrównoważonego budownictwa, zwłaszcza w obszarach tropikalnych.

Słowa kluczowe: ścieki z manioku, strop, wytrzymałość na zginanie, zdolność do przybijania gwoździ, przewodność cieplna, absorpcja wody

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