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ANALISIS MIKROSKOPIK, UJI RASIO KEBOCORAN DAN IMPREGNATION TERHADAP KAYU MERBAU, MERANTI, DAN BAMBU UNTUK FORM-STABLE PHASE CHANGE MATERIAL (FSPCM) = MICROSCOPIC ANALYSIS, LEAKAGE RATIO TEST, AND IMPREGNATION OF MERBAU, MERANTI, AND BAMBOO WOOD FOR FORM-STABLE PHASE CHANGE MATERIAL (FSPCM)

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Abstrak

Peningkatan kebutuhan energi telah meningkat beberapa dekade terakhir. Dilihat dalam konsumsi energi bangunan meningkat menjadi lebih 40% sehingga perlu di kelola dan di kendalikan. Dari solusi permasalahan Laten Heat Thermal Energy Storage (LHTES) dengan Phase Change Material (PCM) merupakan cara yang efisien karena memiliki penyimpanan panas yang tinggi serta perubahan temperatur yang kecil selama proses perubahan fase. Penelitian ini berfokus pada phase change material yang akan di injeksikan ke kayu. Eksperimen ini dilakukan agar mengetahui karakteristik mikro dari kayu setelah proses delignified dan injeksi PCM serta kebocoran dan laju impregnation. Kayu yang akan digunakan yaitu merbau, meranti, dan bambu. Sebelumnya kayu akan mengalami proses delignified untuk membuat struktur berporinya dengan alkaline preatretment dengan NaOH (2,5 mol/L) dan Na₂SO₃ (0,4 mol/L) dengan aquades setelah itu kayu direndamkan larutan H₂O₂(2,5 mol/L) dengan aquades setelah itu kayu di injeksikan dengan paraffin, bees wax, dan soy wax menggunakan metode vacuum impregnation. Dari hasil penelitian kayu merbau dan meranti untuk proses delignified berhasil dengan adanya pori-pori.. Hasil dari kebocoran yaitu bambu/paraffin 60°C, bambu/bees wax 50°C, bambu/soy wax 50°C, merbau/paraffin 60°C, merbau/bees wax 50°C, merbau/soy wax 40°C, meranti/paraffin 50°C, meranti/bees wax 50°C, meranti/soy wax 40°C. Laju impregnation yang tinggi yaitu merbau/paraffin 56,17%, meranti/paraffin 56,07%, merbau/bees wax 55,32%, meranti/bees wax 55,32%, bambu/bees wax 39,31%, bambu/paraffin 37,17%, meranti/soy wax 35,93%, merbau/soy wax 17,9%, dan bambu/soy wax 17,04%.
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The increasing demand for energy has increased in recent decades. In terms of building energy consumption, it has increased by more than 40%, so it needs to be managed and controlled. From then solution to the problem of Latent Heat Thermal Energy Storage (LHTES) with Phase Change Material (PCM) it is an efficient way because it has high heat storage and small temperature changes during the phase change process. This research focuses on the phase change material to be injected into the wood. This experiment was conducted to determine the micro characteristics of the wood after the delignification and PCM injection process as well as the rate of leakage and impregnation. The wood used is merbau, meranti, and

bamboo. Previously, the wood would undergo a delignification process to make its porous structure by alkaline pretreatment with NaOH (2.5 mol/L) and Na₂SO₃(0.4 mol/L) with distilled water. After that, the wood was immersed in a solution of H₂O₂ (2.5 mol/L) with distilled water. After that, the wood was injected with paraffin, bees wax, and soy wax using the vacuum impregnation method. From the research results merbau and meranti wood for the delignification process was successful in the presence of pores. The results of the leaks are bamboo/paraffin 60°C, bamboo/bees wax 50°C, bamboo/soy wax 50°C, merbau/paraffin 60°C, merbau/bees wax 50°C, merbau/soy wax 40°C, meranti / paraffin 50°C, meranti/bees wax 50°C, meranti/soy wax 40°C. High levels of impregnation were merbau/paraffin 56.17%, meranti/paraffin 56.07%, merbau/bees wax 55.32%, meranti/bees wax 55.32%, bamboo/bees wax 39.31%, bamboo/ paraffin 37.17%, meranti/soy wax 35.93%, merbau/soy wax 17.9%, and bamboo/soy wax 17.04%.