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IIUM Engineering Journal
Volume 19, Issue 1, 2018, Pages 185-196

Effect of alkaline treatment on properties of rattan waste and fabricated binderless particleboard (Article)

Ahmad, Z., Tajuddin, M., Salim, N.F.F., Halim, Z.

Department of Manufacturing and Materials Engineering, Faculty of Engineering, International Islamic University Malaysia, Jalan Gombak, Kuala Lumpur, Malaysia

Abstract

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Binderless particleboard (BPB) has become an alternative to avoiding the usage of synthetic resin, possessing excellent properties but having low dimensional stability characteristics. Hence, this study aims to investigate the effects of alkaline treatment on properties of rattan furniture waste (RFW) and fabricated BPB. The RFW was fully immersed in a 1% sodium hydroxide (NaOH) solution for 10 minutes and dried in an oven at 35°C for two days. Then, the treated RFW was used to fabricate the BPB via a hot-pressing process at pressing parameters of 180°C and 5 minutes. The colour of the RFW changed to dark yellowish and chemical analysis showed some reduction in hemicellulose, lignin and ash content after the alkaline treatment, which have been confirmed through peak decline in Fourier Transform Infrared Spectroscopy (FTIR). Only cellulose content increased after treatment due to a disruption of hydrogen bonding on the fibre surface. The treated BPB panels had improved mechanical and dimensional stability compared to untreated BPB panels, and achieved the minimum requirement of board standards. Removal of the fibres' impurities, led to tremendous physical consolidation among fibres. The nature of the panels changed from hydrophilic to hydrophobic as water molecules were released from the fibres during the treatment process. These results were supported by Scanning Electron Microscopy (SEM) analysis that displayed cleaner RFW fibres and rougher surfaces on the treated BPB panels. © 2018 International Islamic University Malaysia-IIUM.

Author keywords

Dimensional stability | Morphology | Strength | Treated | Waste

ISSN: 1511788X
Source Type: Journal
Original language: English

DOI: 10.31436/iiumej.v19i1.879
Document Type: Article
Publisher: International Islamic University Malaysia-IIUM

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