

Title : Effects of Citric Acid and Calcium Carbonate to Mechanical & Flammability Properties of Corn Dust Waste Particleboard Using Polyvinyl Alcohol as Binder

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Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

This research, the utilization of corn dust waste from corn processing plants was studied. The corn dust waste particleboards for application of fire-retardant wall panels were prepared. Polyvinyl alcohol (PVA) was used as a free formaldehyde binder, while citric acid crosslinker and calcium carbonate fire-retardant additive were used to enhance physical properties, mechanical properties, and fire retardancy, respectively. The particleboards were fabricated using a hot-pressing method at 150 °C and 1,500 psi for 30 minutes. The influences of citric acid and calcium carbonate contents on the physical properties, thermal properties, mechanical properties (flexural strength), and fire retardancy of the corn dust waste particleboards were investigated. The results showed that the corn dust particleboards containing 10% citric acid exhibited highest flexural strength of 1.16 ± 0.01 MPa. In addition, the particleboards demonstrated better water and moisture resistance in which water absorption and thickness swelling reduced, thereby enhancing the material's overall stability. Moreover, the addition of calcium carbonate in the range of 20 to 30 percent by weight of corn dust waste in the particleboard resulted in a reduction of flammability rate indicating that the addition of calcium carbonate increased the fire resistance of the particleboard.

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