

Performance of particleboard with palm kernel cake as filler

Abstract

Particleboard is a common product of wood industry. Usually, the particleboard is used as a component of furniture manufacturing or part of building construction. In the production of particleboard, wood glue or binder is applied to form hard bonded particles. The usage of melamine-urea-formaldehyde (MUF) resin as a binder in particleboard production is widely practised. Due to low solid content and the cost of MUF resin, some particleboard manufacturers are adding filler to increase the solid content and to reduce the cost of binder. For example, industrial-grade wheat flour and palm shell powder are commonly used as filler. The performance of wood products is significantly affected by the type of filler used due to the compound composition. Therefore, a study conducted in this work is to investigate the performance of MUF resin-based particleboard produced with palm kernel cake powder as filler. Palm kernel cake (PKC) was chosen due to the protein content that might help in the binding strength and the reduction in free formaldehyde in the wood product. The investigation was conducted by the preparation of particleboard in laboratory with various curing time and quantity of MUF resin and filler used. The performance properties of particleboard such as water absorption (WA), thickness swelling (TS), modulus of rupture (MOR), and modulus of elasticity (MOE) were investigated. Response surface methodology (RSM) of design expert software was used for the experimental design and optimization. The results shown that there is some effect of filler on the performance properties particleboard produced. The optimized or targeted performance also can be identified via design expert software.