
Kajian Keberkesanan *Urea Formaldehyde* dalam Meningkatkan Ketahanan Siling Kapur

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Abstrak

Kajian ini dijalankan untuk menilai keberkesanan penggunaan Urea Formaldehyde (UF) sebagai bahan tambah dalam penghasilan siling kapur kalis air. Objektif utama adalah membandingkan kandungan lembapan dan kekuatan antara siling kapur asal dengan siling kapur campuran UF, serta menentukan peratus optimum UF yang memberikan prestasi terbaik. Tiga peratus campuran UF telah diuji iaitu 10%, 30%, dan 50%. Kaedah kajian melibatkan penghasilan sampel mengikut spesifikasi JKR, diikuti ujian kandungan lembapan melalui rendaman selama 24 jam dan ujian kekuatan menggunakan mesin pemampatan hidraulik. Hasil kajian menunjukkan bahawa penambahan UF berjaya mengurangkan kadar penyerapan air daripada 37.36% kepada 21.21%, serta meningkatkan kekuatan daripada 2.88 bar kepada 3.07 bar, melepasi piawaian minimum MS EN 1296:2010. Campuran UF sebanyak 50% didapati paling optimum kerana memberikan kandungan lembapan paling rendah dan kekuatan tertinggi. Walaupun UF terbukti berkesan, isu pelepasan formaldehid perlu diberi perhatian kerana had pelepasan yang dibenarkan oleh WHO dan OSHA adalah sekitar 0.1 ppm bagi ruang dalaman. Oleh itu, kajian lanjutan wajar menilai tahap pelepasan UF serta meneroka bahan alternatif bio-berasaskan yang lebih mesra alam untuk memastikan keberkesanan dan kelestarian jangka panjang.

Keywords : *Urea Formaldehyde, Siling Kapur, Kalis Kelembapan, Kekuatan Struktur*

Abstract

This study was conducted to evaluate the effectiveness of Urea Formaldehyde (UF) as an additive in producing water-resistant gypsum ceiling boards. The main objective was to compare moisture content and strength between conventional gypsum ceilings and UF-modified samples, and to determine the optimum UF percentage for best performance. Three UF mixtures were tested: 10%, 30%, and 50%. The methodology involved sample preparation according to JKR specifications, followed by moisture absorption tests through 24-hour immersion and strength tests using a hydraulic compression machine. Results indicated that UF addition significantly reduced water absorption from 37.36% to 21.21%, while increasing strength from 2.88 bar to 3.07 bar, exceeding the minimum requirement of MS EN 1296:2010. The 50% UF mixture was found to be the most effective, providing the lowest moisture content and highest strength. Although UF proved effective, concerns regarding formaldehyde emissions must be addressed, as WHO and OSHA set the permissible indoor exposure limit at approximately 0.1 ppm. Therefore, future studies should quantify UF emissions and explore bio-based alternatives to ensure long-term effectiveness and sustainability.

Keywords : *Urea Formaldehyde, Gypsum Ceiling, Moisture Resistance, Structural Strength*
