

PRODUCTION OF FIRE-RETARDANT SOUND-ABSORBING PANELS FROM SAGO WASTE

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ZAINAB N, KHAIRUL AIDIL AZLIN AR, NAZLINA S, HASNAIN H, NORHAIZAT S, TENG JX & LAWAI V. 2013. Production of fire-retardant sound-absorbing panels from sago waste. The accumulation of agricultural waste either in solid or liquid form causes environmental concern. In the utilisation of agricultural waste for developing sustainable construction material, cyclotriphosphazene-incorporated sago wastes as pendant groups were prepared and structurally characterised using infrared spectroscopy and scanning electron microscope. The chemically-modified sago waste composite was applied with binders and developed as sound-absorbing panels. These panels are a class of organic-inorganic-based material that is fire resistant. The absorption coefficient of panels gave higher values at low (250 and 500 Hz) and medium (2000 Hz) frequencies. The panel was 51% lighter than fibreboard. The function and basic manufacturing of sound-absorbing panels were similar to other products available in the market. The panels showed excellent anti-termite properties.

Keywords: Cyclotriphosphazene, ignition, frequency test, anti-termite

ZAINAB N, KHAIRUL AIDIL AZLIN AR, NAZLINA S, HASNAIN H, NORHAIZAT S, TENG JX & LAWAI V. 2013. Penghasilan panel penyerap bunyi cegah kebakaran daripada hampas sago. Pengumpulan sisa pertanian sama ada dalam bentuk pepejal atau cecair telah meningkatkan keprihatinan terhadap alam sekitar. Dalam penggunaan bahan buangan pertanian untuk menghasilkan bahan pembinaan mampan, hampas sago yang bercantum dengan gelang siklotrifosfazena disediakan dan dicirikan menggunakan spektroskop inframerah dan mikroskop imbasan elektron. Komposit hampas sago yang diubah suai secara kimia dicampurkan dengan bahan pengikat untuk dijadikan panel penyerap bunyi. Panel ini dikelaskan sebagai bahan organik-tak organik cegah kebakaran. Pekali penyerapan panel adalah tinggi pada frekuensi rendah (250 Hz dan 500 Hz) dan sederhana (2000 Hz). Panel adalah 51% lebih ringan daripada papan gentian. Fungsi dan pembuatan asas panel penyerap bunyi adalah setanding dengan produk lain di pasaran. Panel menunjukkan ciri anti anai-anai yang baik.

INTRODUCTION

Sago palm is commonly found in tropical lowland forest and freshwater swamps. Sarawak is currently the world's largest exporter of sago products, exporting 25,000–40,000 tonnes of sago products annually to countries such as Singapore, Taiwan and Japan (Singhal et al. 2008). Mass production of sago produces residues during processing. Approximately 7 tonnes of sago pith waste are produced daily from a single sago starch processing mill (Bujang et al. 1996). The residues are discharged into the river, which eventually cause serious

environmental problems. The fibre residues consist of lignin, cellulose and hemicellulose, which can easily generate chemical bonding with electrophiles via hydroxyl groups.

Hexachlorocyclotriphosphazene is an inorganic compound with skeletal nitrogen and phosphorus atoms and is susceptible to nucleophilic substitution. It exhibits unusual thermal properties such as fire retardancy. The incorporation of cyclotriphosphazenes as pendant groups to the backbone of synthetic organic polymers gives a class of organic-

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