

UNIVERSITI TEKNOLOGI MARA

**THE PHYSICAL AND MECHANICAL PROPERTIES
OF GLUTINOUS RICE BIOADHESIVE FILLED
HYDROXYMETHYL PHENOL FOR WALLPAPER
APPLICATION**

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ABSTRACT

Glutinous rice bio adhesive filled hydroxymethyl phenol was successfully prepared. By using mechanical mixing method, glutinous rice flour (GRF) with loading 20%, 30%, 40% and 50% was incorporated together with 6% HPF in order to produce glutinous rice/HPF bio adhesive. The effect of different loadings of GRF filled with HPF were evaluated on Differential Scanning Calorimeter (DSC), Fourier Transform Infrared Spectroscopy (FTIR), shear testing, peel testing and dynamic contact angle test. From DSC analysis, reduction of enthalpy occur which enthalpy value of untreated to treated is 439.57 J/g – 282.05 J/g indicated that reaction between glutinous rice adhesive and HPF occurred. In FTIR analysis, the bond shifted from 3330 cm^{-1} to 3328 cm^{-1} and 1636 cm^{-1} to 1637 cm^{-1} due to the interaction between polar group of HPF and the hydroxyl group of the starch. Besides, peak at 1081 cm^{-1} represent C-O bond from primary alcohol and 1021 cm^{-1} peak represent C-O bond from hydroxymethyl group also appear in glutinous rice bio adhesive with HPF. The optimum loading for shear test is 30% which highest tensile stress, 14.22 MPa was achieved, meanwhile in peel testing result, the optimum loading is at 40% which at 0.812 MPa. In dynamic contact angle test, the loading below 40% is acceptable as the advancing angle is more than 90° indicating that the adhesive repels water. Thus, optimum parameter for the adhesive would be 30% glutinous rice loading with 6% HPF because of highest bonding strength at 14.22 MPa and repel water at 117.84°.

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