

Palm kernel meal as a melamine urea formaldehyde adhesive filler for plywood applications

*Huei RueyOng^{ab}; Md. Maksudur RahmanKhan^a; D.M. ReddyPrasad^c; AbuYousuf^d;
M.N.K.Chowdhury^a*

^aFaculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang,
Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

^bFaculty of Engineering and Technology, DRB-HICOM University of Automotive Malaysia,
26607 Pekan, Pahang, Malaysia

^cPetroleum and Chemical Engineering Programme, Faculty of Engineering, Universiti
Teknologi Brunei, Tungku Highway, Gadong BE1410, Negara Brunei Darussalam

^dDepartment of Chemical Engineering and Polymer Science, Shahjalal University of
Science and Technology, Sylhet 3114, Bangladesh

ABSTRACT

In this work, palm kernel meal (PKM) and palm shell (PS) were studied as a filler for wood adhesive formulations and their efficiency was compared with existing industrial flour (IF). Melamine urea formaldehyde (MUF) was used as resin for formulating the wood adhesives. The effects of the natural fillers (PKM and PS) on shear strength and formaldehyde emission of plywood were analyzed. The optimum hot press temperature and time were found to be 125 °C and 150 s, respectively. Both PKM and IF influenced the shear strength and formaldehyde emission characteristics, with the optimum concentration of filler being within the range of 13% to 18%. The physico-chemical interaction between the wood, resin and filler was investigated using Fourier transform infrared spectroscopy (FTIR) and the interactions among C=O groups on PKM and N-H, O-H groups on wood and MUF were identified. Apart from the bonding strength, the mechanical interlocking between adhesive and wood was found to be very important for adhesive performance which was dependent on the viscosity of the adhesive which in turn was controlled by the filler concentration. The wood –adhesive interface was examined using light microscopy (LM).

KEYWORDS:

Palm kernel meal; Melamine Urea Formaldehyde; FillerWood adhesive; Viscosity