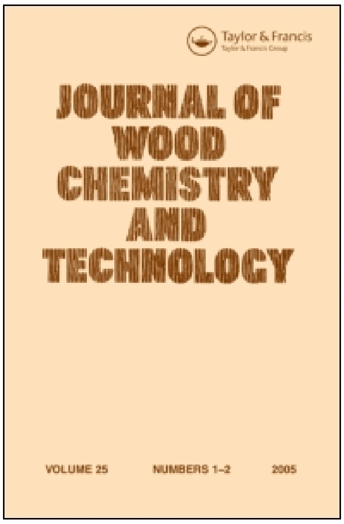

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Erratum

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ERRATUM

A. H. Conner, B. H. River, and L. F. Lorenz, JOURNAL OF WOOD CHEMISTRY AND TECHNOLOGY, 4(4), 533-540 (1984), "Bonding Wood Veneers with Cellulose Solvents" .

Due to a printing error, the continuity of pages 534 and 535 was incorrect. The correct continuity appears on the following pages.

ammonia (cuprammonium hydroxide, often abbrev. cuam, cupram, or cuoxam) or ethylenediamine (cupriethylenediamine hydroxide, often abbrev. cuen, cuene, cuprien, or ced). By light absorption methods Gralen and Linderot[8] showed that in these solutions cellulose is dissolved as a cellulose-copper complex.

Jayme and Verburg[9] discovered that a ferric sodium tartrate complex in sodium hydroxide solution possessed a high dissolving power for cellulose. The term Eisen-Weinsäure-Natrium Komplex (EWNN) is used for this cellulose solvent in much of the European literature, while in most English language publications it is generally referred to as FeTNa. FeTNa is a green complex formed in solution from $Fe(OH)_3$, tartaric acid, and NaOH in the molar ratio of 1:3:6.[3] Franke[10] had described this complex prior to its use as a cellulose solvent. Bayer et al.[11] found that the molar ratio of iron to tartrate in the FeTNa complex could be varied from 1:1 to 1:4.5. They found that acetate grade cotton linters were not soluble in FeTNa at the molar ratio of 1:4.5, but were readily soluble at the molar ratio of 1:3. The 1:3 molar FeTNa complex reacts with the C-2 and C-3 hydroxyl groups of cellulose to complete the unfilled glycol-binding sites of the 1:3 complex. Thus, the fibrous structure of cellulose is first loosened and then the cellulose polymer is brought into solution as a cellulose-FeTNa complex.

Because cellulose solvents have the ability to disrupt the crystalline structure of cellulose and then to dissolve the cellulose, it was of interest to conduct preliminary experiments to determine if cellulose solvents could be used to bond wood panels. Thus, one could envision bonding taking place as the result of several steps. First, the cellulose solvent would be applied to the surface of wood panels to disrupt the crystalline structure and presumably dissolve the cellulose at the surface. Second, the panels would be pressed to bring the two surfaces into intimate contact. Third, the panel would be heated while pressing to remove the volatile components of the cellulose solvent. And fourth, bonding would occur from crosslinking caused by a cellulose-metal complex or hydrogen bonds formed between the surfaces of the two wood panels or both.

The following experiments demonstrate that it is possible to bond wood with cellulose solvents. The bulk of our experiments to determine if wood panels could be bonded with cellulose solvents were conducted with cuene, which is available commercially.

RESULTS

Table 1 shows the dry and wet shear strengths for 2-ply yellow birch panels bonded with cuene, FeTNa, and several other systems. The data presented in this table indicate that fairly high dry shear strengths can be obtained; but that wet shear strengths are low and in some cases nonexistent. No attempts were made to optimize bonding with these systems. However, the data show that the shear strengths of cuene bonded panels depend on the pressing temperature and pressing time. On pressing at 125°C and 965 kPa (140 psi), both the dry and wet shear strengths of the cuene bonded panels increased with pressing time. On pressing at 965 kPa for 5 min over the temperature range of 125° to 185°C, the dry shear strengths of cuene bonded panels continued to increase with temperature. The wet shear strength under these pressing conditions also increased initially, but then declined over the interval from 160° to 185°C.

In experiments conducted for comparative purposes, 2-ply panels bonded with ethylenediamine (EDA) (known to swell cellulose) and with ethylenediamine containing hydroxides other than cupric hydroxide (Table 1) had low to high dry shear strength but no wet shear strengths. Ethylenediamine bonded panels had low dry shear strength. Ethylenediamine in combination with ammonium hydroxide (EDA + NH_4OH) was also a poor bonding system. Ethylenediamine plus sodium hydroxide (EDA + NaOH) gave good dry shear strengths but no wet shear strength. Indeed, sodium hydroxide alone can be used to bond panels with high dry shear strength but no wet shear strength.[12] A question arose whether water, cellulose solvent,