

## **Synthesis of micro carbonaceous material by pyrolysis of rubber wood and its effect on properties of urea-formaldehyde (UF) resin**

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### **ABSTRACT**

Micro sized carbonaceous materials were synthesized by pyrolysis of rubber wood fibers and their dispersion in urea formaldehyde (UF) was investigated. The carbonaceous material reinforced in UF has been prepared with a weight concentration up to 5%. The uniform dispersion of the carbonaceous material in the UF was achieved by mechanical stirring. All resin hybrids were characterized by solution rheology, Fourier transform infrared spectroscopy (FTIR) and powder X-ray diffractometry (XRD) while the dispersion of carbonaceous materials was analyzed by scanning electron microscopy (SEM). FTIR spectroscopy results showed that carbonaceous materials can make hydrogen bonds with UF resins. The X-ray-based measurement of the crystallinity index (CrI) indicated that carbonaceous material increased the crystallinity of UF resin, whereas the maximum value of CrI was observed at UF-1 i.e., 85.7%. Curing reactions were examined with differential scanning calorimetry (DSC), and it was observed that the curing temperature of UF resin is affected by the addition of carbonaceous materials. Thermo-gravimetric analysis (TGA) revealed that carbonaceous materials have little effect on the thermal stability of the resin. Wood particleboards were fabricated and their performance was measured. The internal bonding strength and the modulus of rupture were measured for the particle boards, and a maximum at a 1% weight concentration was observed. The formaldehyde content of particle boards decreased with the addition of carbonaceous materials. At a 1% weight concentration, a maximum reduction of formaldehyde content was obtained using the perforator method.

### **KEYWORDS**

Urea formaldehyde; Carbonaceous material; Crystallinity index (CrI); Formaldehyde content

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