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The similar *in-situ* polymerization of nano cupric oxide preparation and phenol formaldehyde resin synthesis: The process and mechanism

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Abstract

The process and mechanism of phenol-formaldehyde (PF) resin synthesis and nano copper oxide (CuO) preparation simultaneously in the same reaction vessel were studied in this paper. Curing kinetics, molecular structure changes as well as the bonding performance of the modified PF resin was investigated. The results indicated that loading levels of the derived nano CuO at 4% and 8% reduced the apparent activation energy of the PF resin and accelerated both the addition and condensation reactions, while changes of reaction enthalpy were consistent of these results. With the introduction of the derived nano CuO, the chemical shifts of all samples were generally offset to the low field for the solvent effect. A complexation reaction between copper ions and

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