

Knowledge-based Curing of Phenolic Wood Adhesives

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Aqueous phenolic resins are suitable adhesives to produce wood composites for applications with high demands [1]. These adhesives can simultaneously be used as an impregnate to enhance the properties of the wood. Heat is needed to first dry and subsequently cure these resins. However, wood is a heat-sensitive material naturally comprising water. Water enables a fast heat transfer and on the other hand it also prevents temperature rises far above its boiling point. High temperatures speed up the polymerization reactions but can also damage the wood structure leading to loss of material properties. From an economic point of view, curing should be as fast as possible.

Curing of phenolic resins is a series of different condensation reactions. In set of experiments, the influence of drying and curing temperatures and times on both chemistry and product quality were investigated.

The results can be applied to balance the often counteracting effects resulting in a knowledge-based optimization of adhesives and wood composites.

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[1] J. Gomez-Bueso and R. Haupt, in: *Phenolic Resins: A Century of Progress*, Springer-Verlag Berlin Heidelberg, p. 155, L. Pilato, Ed. (2010).