Studies on Solid Wood. II. The Influence of Chemical Modifications on Viscoelastic Properties

The relation between the properties of wood polymers and those of the composite material of wood is a subject that has been of interest for a long time. In order to increase our knowledge in this matter, changes of wood properties have been studied on samples of spruce and birch, subjected to various chemical treatments. Three properties were measured on completely dry samples: stiffness, creep and axial compression strength, using previously developed methods, tailored to slim axial samples, which allow complete impregnation with liquids. On native and treated samples, fully saturated with water, the glass transition was measured by applying sinusoidal vibrations with frequencies of 0.05-20 Hz, giving a transition for each frequency and an apparent activation energy of frequency changes. In wet wood, these quantities characterise the influence of a certain treatment on the properties of lignin. The treatments chosen were immersion in liquid ammonia and aqueous delignification and hydrolysis, acetylation (with anhydride), succinylation (with anhydride) and carbanylation (with phenylisocyanate). Measurements of mechanical and theological alterations demonstrate conclusive effects of the treatments, though it is difficult to relate these effects to wood ultrastructure.

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