

Wood adhesives based on domestic plant proteins

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The objective of this project is the development of biogenic adhesive for wood industry, which do not comprise toxic chemicals and are primarily based on domestic renewable resources, such as plant proteins available in Europe. Plant protein is a natural resource to produce environmentally friendly wood adhesives. Soy protein is one typical type of plant protein already industrially used to substitute synthetic resins for wood adhesives. The application of soy protein-based adhesives has been limited because of the poor water resistance. To overcome this problem, several methods have been employed to improve the performance of soy protein-based adhesives such as cross-linking, enzymatic modification, chemical denaturation, and the addition of additives. [1] However, soy crops are mainly concentrated in the Americas, and are not so widespread in Europe. Thus, it is interesting to evaluate if other vegetable proteins more common in Europe are compatible to be used as wood adhesives. As raw materials proteins from such plants as wheat, potato, pea, corn have been selected. All the selected protein materials were hydrolysed under basic conditions at different molarity of sodium hydroxide and different temperature. During hydrolysis viscosity change of protein suspension was measured. Also the achievable bond strengths were characterized by tensile tests. Moreover, in the production of biogenic adhesives, it is quite conceivable that adhesives develop very good bond strengths but are clearly too slow for industrial applications. Therefore, particular attention is given to the curing process.

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[1] Frihart, C. R.; Hunt, C. G.; Birkeland, M. J. *Soy Proteins as Wood Adhesives*, Chapter 16 in: Gutowski, W.; Dodiuk, H. (Eds.) *Recent Adv. in Adhesion Sci. & Technol. in Honor of Dr. Kash Mittal*, CRS Press, 2013