

## Choosing the Right Lignin for Phenolic Adhesive Application

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**Abstract :** Based on the source (softwood, hardwood or annual crop) and isolation method (kraft, organosolv, sulfite or pre-enzymatic treatment), there are significant variations in lignin structure and properties. The first step in using lignin as biobased feedstock is to make sure that specific lignin is suitable for intended application. Complete characterization of lignin and measuring its chemical, physical and thermal properties can help to predict its suitability. To replace 100% phenol portion of phenolic adhesive, lignin should have high reactivity toward formaldehyde. Theoretically, lignins with closer backbone structure to phenol should be better candidate for this application. In this study, a number of different lignins were characterized and used to formulate phenolic adhesive. One of the main findings was that lignin sample with higher percentage of hydroxyl-phenyl units was better candidate than lignin with more syringyl units. This could be explained by the fact that hydroxyl-phenyl lignin units have two available ortho positions for reaction with formaldehyde while in syringyl units all ortho and para positions are occupied, and there is no available site in lignin structure to react with formaldehyde.

**Keywords :** lignin, phenolic adhesive, biobased, sustainable

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