

Preparation of polyurethane foam based on hydroxymethylation of lignins

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The reactivity of technical lignins depends on their chemical structures and can be increased via chemical modifications. Three types of lignin including alkali-treated lignin, strong acid-treated lignin and weak acid-treated lignin were reacted with formaldehyde using a sodium hydroxide solution. The molecular weights of the resulting hydroxymethylated lignins increased compared with the unmodified technical lignins. Hydroxymethylated alkali-treated lignin showed the highest thermal stability (Td10 of 146 °C). To produce value-added products, biopolyurethane was synthesized using the hydroxymethylated alkali-treated lignin and poly(propylene glycol) tolylene 2,4-diisocyanate in 1,4-dioxane. Thermogravimetric analysis and Fourier transform infrared spectroscopy confirmed that biopolyurethane was synthesized successfully. The mechanical properties of the resulting polyurethane foams were also improved compared with the foam manufactured from PEG400 alone.