

HOW STRUCTURE AND COMPOSITION OF RAW MATERIAL INFLUENCE HEMICELLULOSE EXTRACTION DURING HOT PRESSURIZED WATER PRETREATMENTS

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In literature, there are several examples of studies concerning the extraction of hemicellulose with pressurized hot water from lignocellulosic materials, however there is not any detailed investigation, which compares the extraction efficiency from different species, analyzing the characteristics of the extracted hemicelluloses.

The main hypothesis that we wanted to test is whether there exists a clear relationship between biomass structure, e.g. determined via TGA model analysis, and the quality of the hemicellulose extracted. Fractionation of the wood from 10 different tree species was carried out in a batchwise operated cascade reactor, where mass transfer effects are negligible, at a constant temperature of 160°C. The concentration of hemicellulose extracted from the species was analyzed at 5 different extraction times by calculating and comparing the yields of the extractions. The molecular weights of the oligomers obtained during various extraction times were measured and a direct correlation with the pH of the extracted solution was identified. The content of lignin and cellulose in the various species was also determined, to understand if the composition has an influence on the extraction process. Moreover, the changes occurring in the sample during the reaction were studied by thermo-gravimetric analysis and the variation of the kinetic parameters in the gasification process were investigated with the help of mathematical model. With the help of this methodology, a relationship between the structure of the wood, the total composition, and the yield of hemicellulose extraction was determined.

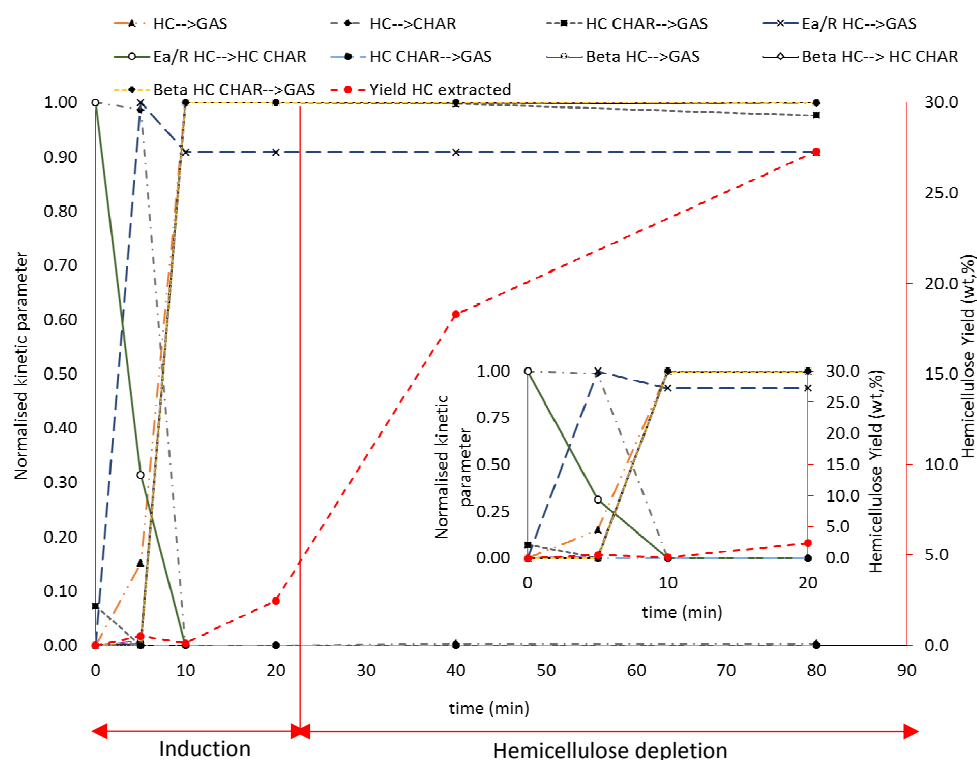


Figure 1. Walnut kinetics evolution with extraction time: pre-exponential factor, activation energy and acceleration factor for reactions where hemicellulose is involved.

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