Chemical Transformations of Hemicellulose during Benzylation of Aspen Wood

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The benzylation of wood without separation it on carbohydrate and aromatic parts are heavily studied in the last decade.

Earlier we have already studied the properties of benzylated products of the components separated from wood. Now the products of benzylation of hemicellulose are studied without separation of reaction substrate from wood complex.

The wood after benzylation was heated and treated by the water solution of the hydrochloric acid (3%). The percent content of the unsubstituted monosaccharides in hydrolyzate was determined by paper chromatography. It was established that the products of the hydrolysis contain unsubstituted xylose only. The percent content of benzylation products are resulted in the table below.

Table

The percent content of unsubstituted xylose (%) in the benzylated wood depending on duration (τ, hours) and temperature (°C) of benzylation

τ , hours	90°C	100°C	110°C
1	17,0	16,4	14,3
2	15,1	13,5	10,5
4	7,6	4,0	2,7
6	4,3	2,8	1,6

The above data were used for estimation of the rate constants of hemicellulose benzylation directly in wood complex. The calculations were carried out using the Erofeev - Kolmogorov - Avraami equation for the topochemical reactions. The rate constants of hemicellulose benzylation are comparable to the similar values in the wood. It should be noted that the rate constants of lignin benzylation are one or two times higher.