

The Possibilities of Receiving of Organic Products from Woody Biomass with the Help of Steam Autohydrolysis Method

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Steam autohydrolysis (SA) of woody biomass based on its treatment by water vapour on higher temperatures and pressures is the variety of thermocatalytic procedures of reprocessing, in which the formic and acetic acids forming in the process are catalysts. The behaviour regularities the main components of hardwoods (aspen) and coniferous (pine, fir) species in the SA conditions in the interval temperatures of 187-240°C, pressure of saturated water vapour 1,2-3,4 MPa and time treating - 30-300 sec., and also the possibilities of complex reprocessing of components of autohydrolysed wood with the getting of valuable organic products have been studied in this work.

It is established, that the basic processes running in the SA conditions of woody biomass are:
functional groups separation with the forming of methanol, isopropanol and acetic acid;
hydrolytic splitting of carbohydrates with the sugar forming;
depolymerization of original lignin with the forming of low-molecular fragments;
dehydration and thermal decomposition of sugar with forming of volatile organic products;

condensation of generating products with lignin fragments with the production of additional lignin amount.

It is established, that lignocarbhydratic complex of aspen wood is less steady in the conditions of autohydrolysis, than pine and fir wood, and water-soluble substances yield can reach for aspen - 22,7%, for coniferous - 18,8%. Mono- and oligosugars - to 12,9%, low-molecular lignin to 7,9%, acetic acid to 5,1% and furfural to 2,2% are entered in water-soluble substances composition. Methanol, isopropanol, propionic acid and hydroxymetilfurfural are present in the capacity of impurity.

It is showed that the hemicellulose content in the autohydrolysed wood is decreased both with increasing of time activation and under temperature to 220°C and under activation time to 120 sec. and more, the hemicellulose content is composed less to 1% in the case of autohydrolyzed aspen wood. The lignin content on the contrary is increased, reaching 32-33%. Cellulose content in the product are practically not depended on process parameters and is composed 42-49%. At the same time the definite part of lignin in the autohydrolyzed wood is affected by depolymerization with forming of low-molecular fragments, easily extracting 0,1N NaOH. It is traced the influence of process parameters on composition of obtaining lignin and solid products.

It is showed that cellulose-containing semi-finished stocks contain to 85% cellulose after water- alkaline extraction of autohydrolyzed wood. Cellulose content is risen to 95-96% while treating of semi-finished stocks by peroxyde of hydrogen in alkaline medium.

On the base of obtained data and having literature data it is suggested the scheme of complicated technology obtaining cellulose-containing semi-finished stocks, cellulose, aromatic oxyaldehydes, forage yeast and activated carbon from autohydrolyzed woody biomass.