

Research of the reducing substances and pH yield kinetics of the wheat straw hydrolysates

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Keywords: reducing substances, pH of hydrolysates, wheat straw, sulfurous acid.

Abstract

In low-acid hydrolysis, the temperature, pH, pressure, and the type of hydrolyzed material can have a significant effect on the yield of reducing sugars. The active acidity of the medium can undergo significant changes under the influence of the reaction products. The processes of hydrolytic decomposition can be facilitated by acetic acid, which is formed during the deacetylation of hemicelluloses, as well as the ability of natural biomass to neutralize acids. The level of neutralization potential (buffer capacity) depends on the type of biomass.

The influence of the pH on the yield of reducing substances in the process of hydrolysis of wheat straw with dilute sulfurous acid in a wide temperature range is investigated. The choice of optimal conditions for the release of reducing sugars is complicated by the need to compare the hydrolysis regimes with several interrelated parameters. In order to analyze the influence of different factors, a comparative assessment of the process conditions was carried out, under which the maximum yield of reducing substances was achieved in each series of experiments. The studies have shown that the initial stage of the process is characterized by a decrease in the actual pH level in hydrolysates, and the greatest change is observed in liquid autohydrolysis products. The pH of hydrolysates, depending on the process mode, varies in the range from 1.26 to 4.1, but the highest yield of reducing substances corresponds to pH values of about 2. It is shown that dimensionless values of the maximum concentrations of reducing substances graphically correspond to the given values of the medium.

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