KINETICS OF THE HYDROLYSIS OF BIOPOLYMERS IN THE PRODUCTION OF PHYTIN

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We have previously optimized the process of extracting phytin by the method of mathematical planning of experimental work [1]. The aim of the present work was to exclude the preliminary heat treatment of the plant raw material and to retain the productivity of the technological cycle.

Methods for hydrolyzing biopolymers with the aid of enzyme preparations under milder conditions than heat treatment have been tested. As a result, the enzyme preparation Amilorizin PIOKh has been selected, which, by a combined amylolytic and proteolytic action at a temperature of 323 K and pH 4.5, cleaves starch to soluble sugar, and with a change in the pH to 2.5 hydrolyzes proteins to amino acids [2, 3].

To select the optimum time for the performance of the fermentation process it was necessary to study the kinetics of the process, and for this as the target parameter we selected the degree of clarification (turbidity) of the extract.

$$X^{(0)} - X + \tau W = 0,$$

The reactor fitted with an anchor-type stirrer, in which the fermentation process takes place with intensive stirring, was considered as an ideal-mixing apparatus. On this basis, the change in the turbidity of the solution can be described by the equation [4] where $X^{(0)}$ is the degree of turbidity at the initial moment of time ($X^{(0)} = 1$); X is the turbidity at time τ; and W is the rate of change of the turbidity of the solution.

By using the experimental values of the degree of turbidity of extracts at time τ we obtain a final equation expressing the change in turbidity during the fermentation process

$$X = 1 + 4.5 \cdot 10^{-4} \tau^2 - 1.5 \cdot 10^{-2} \tau \sqrt{9 \cdot 10^{-2} \tau + 4}.$$

From this it is possible to find the time interval necessary for achieving a given degree of clarification.

The experimental and mathematical results showed that in 1.5 h the degree of clarification reached 90-95%, which corresponds to the technological requirements for the extract-filtration stage and also to the qualitative and qualitative parameters of the final product.

LITERATURE CITED

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