# PROCESSES FOR THE PROCESSING AND RECOVERY OF WASTE FROM THE BEER INDUSTRY

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Currently, the reuse of organic industrial waste in biotechnology for the production of biopreparations contributes to reducing the negative impact on the environment, reduces processing and production costs. Particular attention is paid to the use of yeast waste after the completion of the beer fermentation process, but a significant impediment is that yeast cells have a rigid cell wall which limits their use and applicability. For these reasons, research on the development of efficient waste processing processes in the beer industry is becoming ongoing.

This paper presents the results of a new process based on the separation of the liquid fraction of beer waste sediments from solid, the optimized method of autolysis of yeast biomass for the destruction of cell walls and fractional extraction step by step of cell constituents.

Initially, in the experiments, the liquid fraction of the waste was separated from the solid fraction by centrifugation for 10-15 minutes at 2000 rpm. On average, from 3L of waste is obtained 1.9± 0.03L of liquid supernatant which constitutes the liquid fraction I and 1±0.1 kg of sediment, the ratio of the fractions obtained is 2:1-2. Liquid fraction I contains 37-40 mg/ml S.U. and serves as a raw material for the preparation of LB-H which possesses high enzymatic activity.

Subsequently, the sediment is subjected to autolysis with phosphate buffer (1:1 ratio) at a temperature of +47˚C for 8 hours. The phases are decanted by centrifugation and 1.3±0.02 L of liquid supernatant is obtained per 1 kg of wet biomass, which constitutes the liquid fraction II with 75-80 mg/ml S.U. raw material for obtaining the LB-AAP preparation rich in proteins, amino acids and enzymes. Fraction III is obtained by processing biomass with 1N NaOH solution (1:5 ratio) for 2 hours at a temperature of +80˚C and centrifugation for 10-15 minutes at 3000 rpm. Approximately 3.2±0.2 L of liquid supernatant containing 57-60 mg/mL d.w. is obtained per 1 kg of wet biomass which serves as a raw material for obtaining the LB-MP manoprotein preparation with a high content of carbohydrates, proteins and enzymatic activity.

Fraction IV is obtained from alkali-insoluble cell walls that are treated with a mixture of ethanol: chloroform: 10% acetic acid (5:1:1), at a temperature of +35-40°C for 20 min. followed by repeated extraction with chloroform to a ratio of 5:10:1 and decanting the phases by centrifugation. Approximately 80±0.2 ml of liquid supernatant with 0.5 µg/mL d.w. is obtained from 3 g of wet biomass. raw material for obtaining the lipid preparation LB-L rich in essential fatty acids.

Fraction V solid sediment insoluble in alkalis and acids serves as a raw material for obtaining the preparation LB-GL (carbohydrate β-glucans). At 1 kg of wet biomass, about 202.5±2.5g are obtained.

Thus, the elaborated process allows the complete recovery of the waste of the beer industry by obtaining from the same volume of processed waste, within a continuous technological flow, 5 different fractions, with a varied biochemical content, to obtain preparations of various kinds.

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