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Due to the fact that the planned project methodology of OBT determination is based on previously conducted studies and will apply existing instruments and methods approved in the Republic of Belarus the proposed project is efficient from the economic point of view [2].

The research being conducted, a series of experiments were carried out to study the kinetics of the isotopic exchange of tritium and sodium bicarbonate (NaHCO_3). The results of the study showed that the isotope exchange reaction proceeds quite quickly and does not depend on time. However, the degree of H-T exchange in this case practically remains constant within the limits of measurement error. This suggests that in this case it follows the mechanism of electrolytic dissociation [3]. If the isotope exchange reaction proceeds by the mechanism of electrolytic dissociation, then the degree of exchange depends on the hydrolysis of NaHCO_3 and does not depend on the concentration.

Thus, the development of the project methodology «Determining the specific activity of organically bound tritium in water» is an economical and effective method for measuring the activity of organically bound tritium in drinking water. This methodology is supposed to be included in the current methodology in the Republic of Belarus for measuring the specific activity of tritium in drinking water.

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STUDY OF STABILITY OF AN IMMOBILIZED LIPASE RHIZOPUS JAPONICUS IN THE HYDROLYSIS OF HYDROGENATED FAT

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Lipid bioconversion through the use of immobilized enzyme preparations is one of the most powerful resource potentials of environmental biotechnology. The study is devoted to the influence of the pH of the medium (pH optimum pH stability) and temperature (thermal optimum, thermal stability). The high activity and stability of immobilized lipase make it possible to recommend it for bioconversion of oil and fat waste.

Keywords: immobilization, enzyme, lipase, *Rhizopus japonicus*, waste, hydrogenated fat, oil and fat industry, pH stability, thermal stability.

One of the most important tasks of the food industry is the development of integrated processing of raw materials and waste, as well as improving the efficiency of this processing. In the modern world, thanks to the rapid development of biotechnology, a scientific discovery in the field of enzymology, enzyme preparations have become widely used in many industries. Immobilized lipases can be used in almost all biotechnological processes to produce valuable products. In our case, this is the processing of waste from oil and fat enterprises, namely, waste from the stage of demetallization of hydrogenated vegetable oils [1].

It is known that industrial processes increase the tendency to destabilize enzymes, reducing their industrial life. The technology of enzyme immobilization is an effective way to overcome this problem by increasing the catalytic properties of enzymes and improving the stability of the work [2, 3].

The subjects of the study were *Rhizopus japonicus* lipase, which exhibits the highest activity in relation to hydrogenated fats (PJSC "Vinnitsa Oil and Fat Plant") and activated carbon with a grain size of 2.0–2.8 (LLC "First Gas Industry Company").

The main advantage of immobilized enzymes over native ones is the higher stability of immobilized enzymes than native ones. Previous studies show the effectiveness of the physical sorption method for immobilization of *Rhizopus japonicus* lipase. Optimal conditions of immobilization were also selected, where it was determined that activated carbon results in maximum preservation of initial lipolytic activity, optimal weight ratio of the carrier: the enzyme was 1 g of biopolymer carrier per 500 mg of lipase (1:0,5). Rational conditions of immobilization of *Rhizopus japonicus* are: GM 1,5, temperature 25 °C, duration of immobilization of 15 min, the

grain size of activated carbon, as a matrix, is 2,0–2,8 mm The lipolytic activity of the enzyme immobilized under these conditions is preserved by more than 30 % compared to the native one.

In order to optimize the conditions of fermentation of hydrogenated fat by immobilized lipase, a study of its physical and chemical properties was carried out. For the immobilized lipase *Rhizopus japonicus*, the pH optimum value expanded with a shift from 7.0 to 6.5, and a significant increase in pH stability was observed during prolonged incubation of the immobilized preparation by alkaline and acidic pH environment. It was established that lipase immobilization leads to an expansion of the thermos-optimum, as well as stabilization of the enzyme during prolonged incubation at a temperature of 40 °C and at higher temperatures (60–80 °C). It is established that at 40 °C 80 % of the activity of the immobilized enzyme persists for 50 min, and then its value gradually decreases and after 150 min is 50 % [4].

The results show a higher stability of immobilized lipase *Rhizopus japonicus*. Further use of hydrolyzed waste will yield new products that is additive to rubber wares. The experimental results obtained indicate a higher stability of *Rhizopus japonicus* immobilized lipase compared to the native one. The high activity and stability of immobilized lipase make it possible to recommend it for bioconversion of oil and fat waste.

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RESEARCH OF THE INFLUENCE OF THE BAIKAL EM ON THE COMPOSTING OF FOOD MIXTURE

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The study of the influence of Baikal EM on the composting process of the food mixture was performed according to the following basic parameters: change of temperature, pH, number of microorganisms in the mixture and CO₂ emission from the reactor. The maturity of the compost was determined by the germination index and the ratio of total Carbon and Nitrogen content in the composted mixture Addition of a microbiological additive accelerates the maturation of compost under meso- and thermophilic conditions.

Keywords: microbiological additive, composting, food waste, phytotoxicity.

To study the effect of Baikal EM on the composting process, a mixture of food waste was used, namely, cleaning potatoes, carrots, zucchini and cabbage leaves in a 1: 1: 1: 1 ratio, and each was added soil – southern black humus. Observations were performed in meso- and thermophilic modes, at 19 (sample 1) and 55 °C (sample 2), respectively, and the control sample (sample 3). The fermentation process was carried out for 38–40 days.

During the study, the reactors were isolated from environmental influences, at constant humidity of 72 % and stirring the mixture. The temperature of the compostable mixture was determined using an alcohol thermometer, the end of which was immersed in the test mixture [1].

Selection of a gas mixture of 50 cm³ volume was carried out using disposable plastic syringes. The syringe was attached to a tube to remove gases from the reactors. To determine the amount of carbon dioxide in the sample, we used a gas chromatograph "Chromatek Crystal 5000.2" [2].

Determination of total Carbon was performed by the Türlin method, and total Nitrogen was determined by the Caledal method. The number of microorganisms was estimated by the Koch method [3], namely by sowing on a solid nutrient medium in Petri dishes [4].

According to the results of research, it was found that when adding the microbiological additive Baikal EM, samples 1 and 2 show a high level of compost maturity. The control sample, in which distilled water was used instead of microbiological additives, showed that all were not mature and phytotoxic.

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