ecosystems contaminated with technogenic radionuclides (Cs-137, Sr-90, etc.) as a result of the Chernobyl accident is of particular interest.

Keywords: radionuclide, strontium, radioactive contamination, specific activity.

As a result, of the Chernobyl accident, the radioactive contamination of aquatic ecosystems has become a permanent factor. Over the period from 1992 to 2018, various studies were carried out to determine the activity of Sr-90 and Cs-137 in the following main ecosystem components: water, bottom sediments and aquatic vegetation of the Perstok lake, Borschevsky flooding, and Pripyat creek (near the Krasnoselye village), located in a 15-kilometer Chernobyl exclusion zone.

Considering the above water bodies, radionuclides are distributed extremely unevenly among ecosystem components. Their main concentration is recorded in bottom sediments. In the Perstok Lake, the activity of Cs-137 and Sr-90 in bottom sediments is 6551 and 2595 Bq/kg dry weight, respectively; in Borschevsky flooding - 3062 and 165 Bq / kg dry weight, respectively. In the Perstok Lake, volumetric water activity on Cs-137 is 13.9–19.3 Bq / l, and on Sr-90 – 3.1–13.4 Bq / l. It has been established that a significant impact on the activity levels of radionuclides in various components of standing aquatic ecosystems is exerted by their migration in the directions of "bottom sediments ↔water ↔ biota".

The main dose-forming radionuclide of greatest interest is Sr-90. The following methods can be employed to determine the Sr-90 content in objects of aquatic ecosystems:

1. Using chromatographic columns and a Tri-Carb liquid scintillation counter radiochemical analysis.
2. Using a semiconductor detector.
3. Using a scintillation detector.

Using both radiochemical and spectrometric methods allows the most accurate assessment of Sr-90 specific activity in the objects of aquatic ecosystems in the territories exposed to radioactive contamination.

BIBLIOGRAPHY

1. *Gudkov, D. I.* Distribution of radionuclides among the main components of lake ecosystems in the exclusion zone of the Chernobyl NPP / D. I. Gudkov [et al.] // Radiation biology. Radioecology. – 2005. – T. 45, No. 3. – P. 271–280.

2. *Golubev, A. P.* Dynamics of radioactive contamination of ecosystems of different types of water bodies in the Belarusian sector of the exclusion zone of the Chernobyl NPP / A. P. Golubev [et al.] // Radiation biology. Radioecology. – 2007. – T. 47, № 3. – P. 322–332.

3. *Evdokimov, V. N.* Long-term dynamics of radionuclides in the bottom sediments of Lake Perstok (10-km Chernobyl zone) / V. N. Evdokimov, K. M. Kireenko, V. S. Piskunov // Ecological problems of Polesye and adjacent territories. – Gomel, 2000. – P. 34–35.

DEVELOPMENT OF THE «DETERMINATION OF SPECIFIC ACTIVITY OF ORGANICALLY BINDED TRITIUM IN WATER» PROJECT METHODOLOGY

H. Skibinskaya, V. Mironov

Belarusian State University, ISEI BSU,
Minsk, Republic of Belarus
skopets.0804@gmail.com

In recent years, not only tritium oxide (HTO), but also organically bound tritium (OBT) with high dose coefficients has been standardized in sanitary norms and rules. Currently, the measurements of organically bound tritium in drinking water are not carried out due to the lack of methodology. Therefore, the development of a methodology for the determination of organically bound tritium in drinking water is an urgent task. [1].

Keywords: radionuclide, tritium, organically bound tritium, tritium oxide.

Organically bound tritium presents more serious risk factors than tritium oxide for a number of reasons. One of the main reasons is that organic bonded tritium has a four times higher clearance than tritium oxide. The studies show that a half of tritium oxide is excreted every 10 days, the OBT excretion rate being about 40 days [1].

The content monitoring of organically bound tritium in water bodies taking into account its possible physicochemical forms and properties is especially relevant for solving the problems of ensuring radiation safety of the population and the environment during the operation of the Belarusian NPP.

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 (NaHCO3). 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 NaHCO3 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.

BIBLIOGRAPHY

1. *Soifer, V. N.* Tritium studies of natural waters in Russia / V. N. Soyfer, V. A. Goryachev, S. M. Vakulovsky, I. Yu. Katrich. – Moscow : GEOS, 2008 . – 286 p.

2. *Mironov, V. P.* Methodology for determining the specific activity of tritium in water using liquid-scintillation radiometers of the TRI-CARB and QUANTULUS series: MVI.MN 4143 / V. P. Mironov, V. V. Zhuravkov, O. P. Kudina.– Мінск : BelGIM, 2011. – 19s.

3. Monitoring of the environment and sources for radiation protection: hands. Safety RS-G-1.8 / IAEA. Vienna, 2016. – 168 s.

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

V. Skliar, G. Krusir

Odessa National Academy of Food Technologies,
Odessa, Ukraine
vsklyar1993@gmail.com

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