



CONTROL OF RADIONUCLIDES CONTENT IN FOOD PRODUCTS

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Ionizing radiation is called the one, that leads to the formation of the ions (charges of different signs) in the environment.

Ionizing radiation is radiation that carries enough energy to liberate the electrons the from atoms or molecules by ionizing them. Ionizing radiation is composed of the energetic subatomic particles, ions or atoms moving at relativistic speeds, and electromagnetic waves in the high-energy end of the electromagnetic spectrum.

Types of Ionizing radiation:

1. Photon

Gamma-radiation

X-ray

2. Corpuscular

Alpha-radiation

Beta-radiation

The flow of particles (photons, neutrons)

Radiation has always been a natural part of our environment. Natural radioactive sources in the soil, water and air contribute to our exposure to ionizing radiation, as well as man-made sources resulting from mining and use of naturally radioactive materials in power generation, nuclear medicine, consumer products, military and industrial applications.

There are three factors that control the amount or dose of radiation received from a source. Radiation exposure can be managed by a combination of such factors:

1. Time: Reducing the time of an exposure reduces the effective dose proportionally.

2. Distance: Increasing the distance reduces the dose due to the inverse square law.

3. Shielding: The term 'biological shield' refers to a mass of absorbing material placed around a reactor, or other radioactive source, to reduce the radiation to a level safe

for the humans.

Background radiation comes from both natural and man-made sources.

The global average exposure of the humans to ionizing radiation is about 3 mSv (0.3 rem) per year, 80% of which comes from nature. The remaining 20% results from the exposure to man-made radiation sources, primarily from medical imaging. Average man-made exposure is much higher in the developed countries, mostly due to CT scans and nuclear medicine.

Natural background radiation comes from five primary sources: cosmic radiation, solar radiation, external terrestrial sources, radiation in the human body, and radon.

The devices assigned for the measurement (detection) of ionizing radiation are called dosimeters.

The Classification of the Dosimetric Devices:

1. The Indicators are assigned to estimate the dose rate. DP - 63A, DP - 64.
2. The Roentgenometer is assigned to determine the radiation background. SRP - 68 - 01, "Terra", DBG – 01H.
3. The Radiometers determine β -particles in food, water, raw materials (specific activity of radionuclides). Radiometer "Beta", radiometer "Pripyat".
4. The Individual dosimeters are assigned to determine a radiation dose for the human. DP - 24 (22V), DK – 02, ID – 1, ID - 11.

The students are studying the methods and procedures to measure the radioactive pollution in food, water and raw materials at the practical work of the Life Safety. It is also important during the control of radionuclides contaminant in samples to know not only the number of these radionuclides, but also their activity. Activity - one of the main quantitative characteristics of the radionuclide.

The activity is measured in Becquerel (Bq) units according to the SI.

1 Bq - 1 nuclear transformation per 1sec, means 1 disintegration / s = 1 Bq

The results of determined radionuclides contaminant in the samples of food products comparing with acceptable levels of Cs_{137} and Sr_{90} which are in table 1.

Tab. 1.

The Acceptable Levels of the Radionuclides in Food and Drinking Water (PL - 2006)

№	The product name	The permissible content of the radionuclides	
		Cs_{137} , Bq/kg, Bq/l	Sr_{90} Bq/kg, Bq/l
1	2	3	4
1	Bread and bread products	20	5
2	Potatoes	60	20
3	Vegetables	40	20
4	Fruits	70	10
5	Meat and meat products	200	20
6	Fish and fish products	150	20
7	Milk and milk products	100	35
8	Eggs	6	202
9	Water	2	2
10	Fresh wild berries and mushrooms	500	50
11	Dry wild berries and mushrooms	2500	250
1	2	3	4

Тематичне питання: СИСТЕМИ УПРАВЛІННЯ ЯКІСТЮ І БЕЗПЕКОЮ ХАРЧОВОЇ ПРОДУКЦІЇ ТА НЕПРОДОВОЛЬЧИХ ТОВАРІВ
Тематический вопрос: СИСТЕМЫ УПРАВЛЕНИЯ КАЧЕСТВОМ И БЕЗОПАСНОСТЬЮ ПИЩЕВОЙ ПРОДУКЦИИ И НЕПРОДОВОЛЬСТВЕННЫХ ТОВАРОВ

12	Herbals	600	200
13	Special products for baby food	40	5
14	Other products	600	200

The new knowledge and skills which students are getting at practical works of Life Safety about measuring the level of radioactive contamination of foodstuffs and raw materials are necessary for population healthy eating.

Literature

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