

Method of Test of Radionuclides in Foods

1. Scope

This method is applicable for the determination of the specific activity of radionuclides, including ^{131}I , ^{134}Cs , and ^{137}Cs in foods.

2. Method

The sample is placed in a Marinelli beaker or another proper container, and radionuclides are determined by gamma-ray spectrometry.

2.1. Equipment

2.1.1. Gamma-ray spectrometer

2.1.1.1. High purity germanium detector

2.1.1.2. Multi-channel pulse-height analyzer

2.1.2. Marinelli beaker

2.2. The first screening step

Transfer about 100-600 g of the sample into a Marinelli beaker or another proper container, and then put into a high purity germanium detector coupled with a multi-channel pulse-height analyzer to accumulate gamma spectra. The measuring time depends on the relative efficiency of the germanium detector. The minimum detectable amount (MDA) requires less than 5 Bq/kg in beverages and bottled water, or 10 Bq/kg in milk, milk products, infant foods and other foods. When ^{131}I , ^{134}Cs , or ^{137}Cs is detected, a further quantitative analysis is required.

2.3. The second quantitative step

Transfer about 100-600 g of the homogenized solid sample or 900-1000 g of the mixed-well liquid sample accurately weighed into a Marinelli beaker or another proper container, and then put into a high purity germanium detector coupled with a multi-channel pulse-height analyzer to accumulate gamma spectra. The measuring time depends on the relative efficiency of the germanium detector. The MDA requires less than 1 Bq/kg. Calculate the specific activity of each radionuclide in the sample by the following formula:

The specific activity of each radionuclide in the sample (Bq/kg) = $\frac{A}{M} \times 1000$

Where,

A: the specific activity of each radionuclide measured in the sample (Bq)

M: the weight of the sample (kg)

Remark

1. For dry foods intended to be consumed in a reconstituted state (e.g., dried products of mushrooms, seaweeds, fish, shellfish and vegetables), the specific activity of each radionuclide is calculated by the weight after reconstituting to ready-to-eat state. For foods intended to be consumed in a dried state (such as nori, niboshi, dried cuttlefish, and raisin), the specific activity of each radionuclide is directly calculated by the dry weight. For tea leaves, the specific activity of each radionuclide is calculated by the weight of a liquid extract obtained after the brewing process. Typically, take more than 10 g of tea leaves, soak in hot water 30 times the weight of the sample at 90°C for 60 seconds, filter through a 40-mesh sieve, and take the filtrate as a liquid extract.
2. Further validation should be performed when interfering compounds appear in samples.

Reference

The Atomic Energy Council. Method of test of the specific activity of radionuclides in foods for emergency measurement.