

ICS 67.040
CCS C 53



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 14883.8-2016

Replacing GB 14883.8-1994

**National Food Safety Standard -- Determination of radioactive
substances plutonium - 239 and plutonium - 240 in foods**

食品安全国家标准 食品中放射性物质钚-239、钚-240的测定

(English Translation)

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Foreword

This standard replaces GB 14883.8-1994 "Food Examination of radioactive materials plutonium-239, plutonium -240 determination." this standard compared with GB 14883.8-1994, the main changes are as follows.

- Standard name was changed to "national food safety standards in food radioactive plutonium-239, plutonium -240 determination";
- National food safety standards in accordance with the format of the text has been adjusted;
- Sort out and changed the order of some of the terms and formulas;
- Added "low background alpha spectrometer ready" requirement;
- The second method to TOA to replace the original standard methods N235.

National Food Safety Standard Determination of radioactive materials plutonium-239, plutonium - 240

1 Scope

This standard applies to the determination of various foods plutonium -239 (^{239}Pu) and plutonium -240 (^{240}Pu) of the total radioactivity concentration.

The first ion exchange method Principle 2 Nitric acid and hydrogen peroxide leach food ash, 7mol/L ~ 8mol/L nitric acid medium to $[\text{Pu}(\text{NO}_3)_6]^{2-}$ form (Pu^{4+}) set the amount adsorbed on the anion exchange resin with different concentrations of hydrochloric acid and nitric acid leaching solution to remove the common alpha emitters and common cation impurities, with 0.36mol/L hydrochloric acid -0.01 mol/L mixture of hydrofluoric acid desorption, electrodeposition legal source, measured on a low background alpha spectrometer ^{239}Pu (5.157MeV) and ^{240}Pu (5.168MeV) total concentration (hereinafter referred to as $^{239/240}\text{Pu}$).

3 Reagents and materials

Unless otherwise indicated, the methods used were of analytical grade reagents and water as a water GB/T 6682 regulations.

3.1 Reagents

3.1.1

hydrochloric acid (HCl).

3.1.2

hydrofluoric acid (HF).

3.1.3

nitric acid (HNO₃).

3.1.4

Ammonium nitrate (NH₄NO₃).

3.1.5

hydroxylamine hydrochloride (NH₂OH · HCl).

3.1.6

Sodium nitrite (NaNO₂).

3.1.7

sodium hydroxide (NaOH).

3.1.8

Hydrogen peroxide (H₂O₂).

3.2 Reagent preparation

3.2.1

hydrochloric acid - a mixture of hydrofluoric acid. hydrochloric acid solution will 180mL1mol/L/poured into 500mL volumetric flask, add 20mL0.26mol/L Hydrofluoric acid solution and diluted with water to the mark.

3.2.2

hydrochloric acid - a mixture of nitric acid. hydrochloric acid was poured into 500mL to 333mL volumetric flask, add 9.4mL nitric acid and diluted with water to the mark.

3.2.3

Ammonium nitrate - nitric acid mixture. 5 by volume 0.1mol/L solution of nitric acid and three volumes of 0.4mol/L ammonium nitrate solution mixed.

3.2.4

nitric acid solution. 1mol/L, 3mol/L, 7mol/L, 7.5mol/L and 10mol/L.

3.2.5

sodium hydroxide solution. 6mol/L.

3.2.6 2mol/L hydroxylamine hydrochloride solution. Weigh 139g of hydroxylamine hydrochloride, dissolved in an appropriate amount of water, diluted with water to 1L.

3.2.7 2mol/L sodium nitrite solution. Weigh 138g of sodium nitrite, dissolved in an appropriate amount of water, diluted with water to 1L.

3.2.8 251 x 8 trimethylamine polystyrene strong base anion exchange resin. 180 μ m ~ 250 μ m. The appropriate amount of resin is poured into 1L burn Cup, soaked in water for 24h, decanted upper layer of water. Poured into 10% sodium hydroxide solution, and the solution above the resin of about 2cm, stirring occasionally. About 2h After the liquid was decanted, washed once. After washing the decanted solution was poured into 1mol L hydrochloric acid solution/the solution above the resin of about 2cm, stirring occasionally.

2h after the acid was decanted, washed repeatedly with water until no chlorine ions in solution, dried spare.

Recycled resin. first with 10mL of hydrochloric acid - hydrofluoric acid mixed solution (3.2.1) with 1mL/min flow rate through the column, and then 20mL 7.5mol/L nitric acid through the column at the same flow rate, the standby.

3.3 Standard

^{239}Pu standard solution. radioactive intensity of about 10 decays/(min · mL) magnitude, 0.5mol/L nitrate system.

4 Instruments and equipment

4.1

Low background alpha spectrometer.

- a) shall not be less than the diameter of the probe-plated stainless steel sheet (4.8) the diameter of the active region;
- b) alpha spectrometer energies greater than 3MeV integral background count should not exceed 1/h, in the corresponding channel address ^{239}Pu points should not exceed background 0.2 count/h;
- c) energy source in 5MeV thin electrodeposited standard resolution should be better than 0.5%, with a plurality of non-linear check reference sources should be less than alpha 1%, ^{239}Pu measuring efficiency characteristics Road area should not be less than 20%;
- d) alpha spectrometer continuously good stability, 24h drift should be less than 1%.

4.2

muffle furnace.

4.3

centrifuge. speed 3000r/min, the volume of 50mL centrifuge tube or 100mL.