

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

HJ 815-2016

Replacing GB/T 6766-1986; GB/T 6764-1986; GB/T 6765-1986; GB/T 11222.1-1989

**Radiochemical analysis of strontium-90 in water and ash of
biological samples**

水和生物样品灰中锶-90的放射化学分析方法

(English Translation)

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Table of Contents

Preface

1 Scope of application

2 Normative reference documents

3 - di - (2 - ethylhexyl) phosphoric acid extraction chromatography

3.1 Principle of the method

3.2 Reagents and materials

3.3 Instruments and equipment

3.4 Collection and storage of samples

3.5 Analysis Step

4 Smoke Nitric Acid Precipitation Method

4.1 Principle of the method

4.2 Reagents and materials

4.3 Instruments and equipment

4.4 Collection and storage of samples

4.5 Analysis Step

5 Ion exchange method

5.1 Principle of the method

5.2 Reagents and Materials

5.3 Instruments and equipment

5.4 Collection and storage of samples

5.5 Analysis steps

6 Instrument scale

7 Results Calculate

8 Method validation

8.1 Blank experiment .14

8.2 Precision

Appendix A (informative) yttrium-90 decay and growth factor

Appendix B (informative) Supplementary note on the implementation of the standard

Foreword

In order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Radioactive Pollution, Human health, regulate environmental monitoring methods, the development of this standard.

This standard specifies the radiochemical analysis method for the determination of strontium-90 in water and bio-sample ash.

This standard is a method for the determination of di- (2-ethylhexyl) phosphoric acid extraction by the method of radiochemical analysis of strontium-90 in water (GB 6766-86) "Radiochemical analysis of strontium-90 in water Smoke nitric acid precipitation method" (GB 6764-86), "Radiochemical analysis of strontium-90 in water Sub-exchange method "(GB 6765-86)," Radiochemical analysis of strontium-90 in ash of biological samples Extraction of di- (2-ethylhexyl) phosphate Color method "(GB 11222.1-89) four standards of the integration of amendments, the use of analytical principles and the original standard is basically the same.

"Radiochemical analysis of strontium-90 in water 2 - (2-ethylhexyl) phosphoric acid extraction chromatography" (GB 6766-86) first release in 1986, the original standard drafting unit for the Ministry of Nuclear Industry Radiation Protection Institute; "water strontium-90 radiochemical analysis method smoke nitric acid Precipitation method "(GB 6764-86) was first released in 1986, the original standard drafting unit for the state-owned eight one two plants, the Ministry of Nuclear Industry radiation protection research and the China Atomic Energy Research Institute; "ion exchange of strontium-90 in the water ion exchange method" (GB 6765-86) first published in 1986 Year, the original standard drafting unit for the Southwest Institute of Nuclear Physics and Chemistry, the Ministry of Nuclear Industry Institute of Radiation Protection, China Atomic Energy Research Institute;

(2-ethylhexyl) phosphate extraction chromatography "(GB 11222.1-89) for the first time, the method of radiochemical analysis of strontium-90 in the sample ash Published in 1989, the original standard drafting unit for the China Institute of Radiation Protection. This is the first revision. The main contents of the amendment are as follows.

- the four original standards were integrated, merged into a standard;
- increased the requirements for blank experiments;
- Revised some of the contents of the original standard method.

This standard since the date of implementation, the former State Environmental Protection Agency on September 4, 1986 approved the release of the three national environmental protection standards "water (2-ethylhexyl) phosphoric acid extraction chromatography "(GB 6766-86)," radiation of strontium-90 in water Chemical analysis method fuming nitric acid

precipitation method "(GB 6764-86) and" water strontium-90 radiochemical analysis method ion exchange method "(GB 6765-86), as well as the former State Environmental Protection Agency approved on March 16, 1989, issued a national environmental protection standards "biological sample ash Determination of strontium-90 by radiochemical analysis of di-(2-ethylhexyl) phosphate extraction chromatography "(GB 11222.1-89).

Appendix A and Appendix B of this standard are informative.

This standard is organized by the Ministry of Environmental Protection Nuclear Safety Management Division, Science and Technology Standards Division.

The main drafting of this standard. Ministry of Environmental Protection Radiation Environmental Monitoring Technology Center (Zhejiang Province, radiation environmental monitoring station).

The environmental protection department of this standard approved on October 12, 2016.

This standard has been implemented since November 1, 2016.

This standard is explained by the Ministry of Environmental Protection.

Radiochemical analysis of strontium - 90 in water and biological samples

1 Scope of application

This standard specifies the radiochemical analysis method for the determination of strontium-90 in water and bio-sample ash.

The 2 - (2 - ethylhexyl) phosphoric acid extraction chromatography method in this standard is suitable for the determination of strontium - 90 in water and animal and plant ash.

Smoke nitric acid precipitation method and ion exchange method for the determination of strontium-90 in water.

The measurement range of this method is. the activity concentration of strontium-90 in water is 10⁻² ~ 10Bq/L, the activity of strontium-90 in plant ash for 10⁻¹ to 10Bq.

2 Normative reference documents

The contents of this standard refer to the terms of the following documents. For undated references, the valid version applies to this standard quasi.

GB/T 6379 Accuracy of measurement methods and results (accuracy and precision)
Technical specification for preservation and management of samples for water quality sampling
Technical specification for radiation environmental monitoring of HJ/T 61 3 - di - (2 - ethylhexyl) phosphoric acid extraction chromatography

3.1 Principle of the method

The activity of strontium-90 in the sample was determined by the activity of yttrium-90, which is a radionuclide nuclide in its radioactive equilibrium.

3.1.1

rapid method. the sample by pretreatment, adjust the acidity, the solution by coating with di - (2 - ethylhexyl) phosphoric acid (referred to as HDEHP) of the polychlorotrifluoroethylene (kel-F) chromatography column adsorption of yttrium, and then 1.5mol/L nitric acid leaching chromatography column, elution Yttrium other than the adsorption of strontium, cesium, cerium, plasma, and 6mol/L nitric acid desorption yttrium, oxalate precipitation in the form Perform beta counting and weighing.

3.1.2

Placement method. sample pretreatment method and fast method. After adjusting the acidity of the solution, through the HDEHP-kel-F color column, Remove yttrium, iron and rare earth and other elements. The effluent for 14d or more, so that yttrium -90 and strontium-90 to achieve radioactive balance, Column chromatography, separation and determination of yttrium-90.

3.2 Reagents and materials

Unless otherwise stated, analytical reagents and distilled water or equivalent purity are used in accordance with national or professional standards of water. The activity of the radioactive material in the reagent shall ensure that the count rate measured by the blank sample does not exceed the statistical error of the background of the instrument.

3.2.1

bis - (2 - ethylhexyl) phosphoric acid (C₁₆H₃₅O₄P). chemically pure, the content of not less than 95%, rho = 0.969 ~ 0.975g/mL.

3.2.2

n-heptane (C₇H₁₆). rho = 0.681 ~ 0.687g/mL.

3.2.3

polychlorotrifluoroethylene powder (kel-F). 60 to 100 mesh.

3.2.4

nitric acid. mass fraction of 65.0% ~ 68.0%.

3.2.5

Hydrogen peroxide. mass fraction of not less than 30%.