

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

**HJ 841-2017**

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**Analytical method for  $^{131}\text{I}$  in water, milk, plant and animal  
thyroid gland**

水、牛奶、植物、动物甲状腺中碘-131的分析方法

**(English Translation)**

**Issued on: July 7, 2017**

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## 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, Quantity management, standardize environmental monitoring methods, the development of this standard.

This standard specifies the analysis of iodine-131 in water, milk, plants, and animal thyroids.

This standard on "water iodine-131 analysis method" (GB/T 13272-91), "milk iodine -131 analysis method" (GB/T 13273-93), "Plant, animal thyroid iodine-131 analysis method" (GB/T 13273-91) were integrated, its the main technical content is basically the same as the original standard.

"Analysis method of iodine-131 in water" (GB/T 13272-91) was first published in 1991, "Analysis of iodine-131 in milk Law "(GB/T 14674-93) was first published in 1993," plant, animal thyroid iodine-131 analysis method " (GB/T 13273-91) was first released in 1991, the standard drafting units are China Atomic Energy Research Institute. This time for the first time Revised, the main content.

- Integrate the above three criteria into one standard;
- increased the efficiency scale of the gamma spectrometer;
- increase the calculation of the lower limit of the method;

- the decay correction coefficients during the measurement period are introduced in the calculation formulas (1), (4), (7) and (8) - Revised part of the content.

Appendix A of this standard is an informative appendix.

Appendix B to this standard is an informative appendix.

From the date of implementation of this standard, "analysis method of iodine-131 in water" (GB/T 13272-91), "Analysis of iodine-131 in milk Method" (GB/T 14674-93), "plant, animal thyroid iodine-131 analysis method" (GB/T 13273-91) abolished.

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

The main drafting unit of this standard. radiation environment monitoring station in Zhejiang Province, Guangxi Zhuang Autonomous Region Radiation Environmental Supervision and Management Station the Environmental Protection Department of this standard was approved on July 7, 2017.

This standard has been implemented since August 1, 2017.

This standard is explained by the Ministry of Environmental Protection.

## **1 Water, milk, plant, animal thyroid iodine-131 analysis method**

1 Scope of application this standard specifies the analysis of iodine-131 in water, milk, plants, and animal thyroids.

This standard applies to the environment of water, milk, goat milk and other liquid milk samples and plants, animal thyroid iodine -131 activity concentration analysis.

## **2 Method summary**

Water and milk samples of iodine-131, concentrated with a strong alkaline anion exchange resin, sodium hypochlorite desorption, carbon tetrachloride extraction, sulfur Sodium hydrogen acid reduction, water stripping, made of silver iodide precipitation. Measured with a low background beta meter or a low background gamma spectrometer.

Plant samples, animal thyroid iodine-131, fixed with iodine, hydrogen peroxide to help ash, water extraction, carbon tetrachloride extraction Take, water stripping, made of silver iodide precipitation. Measured with a low background beta meter or a low background gamma spectrometer.

## **3 Reagents and materials**

Unless otherwise stated, analytical reagents and distilled water or equivalent purity water are used in accordance with national or professional standards.

Other grades of reagents can be used as long as they are preliminarily determined to have a sufficiently high purity and are not used to reduce the measurement accuracy.

### 3.1 Iodine carrier solution

Dissolved in 13.070 g of potassium iodide in distilled water, transferred to 1L volumetric flask. Add a little anhydrous sodium carbonate, diluted to the mark.

3.2 iodine-131 reference solution. nuclear pure;

3.3 sodium hypochlorite (NaClO). active chlorine content of 5.2% or more, preserved at low temperature;

3.4 sodium hypochlorite (NaClO). active chlorine content of 2.6% or more, preserved at low temperature;

3.5 carbon tetrachloride (CCl<sub>4</sub>). mass concentration 99.5%;

3.6 Hydroxylamine Hydrochloride Solution.  $c(\text{NH}_2\text{OH} \cdot \text{HCl}) = 3 \text{ mol/L}$ ;

3.7 Silver nitrate solution (AgNO<sub>3</sub>). mass concentration 1%;

3.8 sodium bisulfite solution (NaHSO<sub>3</sub>). mass concentration of 5%;

3.9 Sodium hydroxide solution (NaOH). mass concentration 5%;

3.10 Sodium hydroxide solution.  $c(\text{NaOH}) = 1 \text{ mol/L}$ ;

### 3.11 Nitric acid (HNO<sub>3</sub>). mass concentration 65.0% ~ 68.0%

3.12 Nitric acid solution (HNO<sub>3</sub>). 1 L;

3.13 hydrochloric acid solution.  $c(\text{HCl}) = 1 \text{ mol/L}$ ;

23.14 sodium nitrite solution.  $c(\text{NaNO}_2) = 5 \text{ mol/L}$ ;

3.15 Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). 30% mass concentration;

3.16 2 mol/L sodium hydroxide solution 2 mol/L solution of potassium hydroxide solution. (3 2);

Follow steps 3.18.1.2.

## 4 Equipment

### 4.1

low background beta measuring instrument. the background is less than 1cpm;

### 4.2

low background gamma spectrometer;

**4.2.1**

Nal gamma spectrometer. cylindrical Nal (TI) crystal with size not less than  $\Phi 7.5\text{cm} \times 7.5\text{cm}$ , and 661.6keV of  $^{137}\text{Cs}$  the energy peak resolution is less than 9%.

**4.2.2**

high purity germanium gamma spectrometer. sensitive volume should be greater than  $50\text{cm}^3$ ,  $^{60}\text{Co}$  1332.5keV gamma ray energy resolution is less than 32.2 keV.

**4.3**

Analysis of balance. readability 0.1 mg;

**4.4**

electric stirrer;

**4.5**

high frequency heat sealing machine;

**4.6**

Glass exchange column. see Figure B.1 in Appendix B;

**4.7**

glass desorption column. see Figure B.2 in Appendix B;

**4.8**

Glass Removable Funnel. See Appendix B, Figure B.3;

**4.9**

stainless steel pressure source mold. see Figure B.4 in Appendix B;

**4.10**

Seal copper ring. see Figure B.5 in Appendix B;

**4.11**

mortar hammer;

**4.12**

porcelain evaporative dish. 600 ml ~ 750 ml.

## **5 Sampling**

**5.1**

Water sample. Select representative point sampling. Rivers or lakes are generally selected for their central area sampling, tap water to collect the end of the water pipe Phase acidity to pH 1 (aqueous phase acidity with a fine pH test strip from the bottom of the separatory