

HJ

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Ambient air Determination of gamma radionuclide in aerosol filter membrane/gamma spectrometry

环境空气 气溶胶中 γ 放射性核素的测定 滤膜压片 γ 能谱法

(English Translation)

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Foreword

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" and protect the ecological environment, to protect human health, standardize the determination method of gamma radionuclide in ambient air aerosol, and formulate this standard.

This standard specifies the routine monitoring of the radiation environment, the method of measuring gamma radionuclides in ambient air aerosols by the filter press/gamma spectroscopy method law.

Appendix A to Appendix C of this standard are normative appendices, and Appendix D and Appendix E are informative appendices.

This standard is issued for the first time.

This standard was formulated by the Department of Nuclear Facilities Safety Supervision and the Department of Regulations and Standards of the Ministry of Ecology and Environment.

Drafting organization of this standard. Zhejiang Radiation Environment Monitoring Station (Radiation Environment Monitoring Technology Center of Ministry of Ecology and Environment).

Verification unit of this standard. Liaoning Province Ecological Environment Monitoring Center, Jiangsu Province Nuclear and Radiation Safety Supervision and Management Center, Zhejiang Province Radiation Environment Monitoring Station, Shandong Province Radiation Environment Management Station, Guangdong Province Environmental Radiation Monitoring Center, Sichuan Province Radiation Environment Management Monitoring Center Station and China National Nuclear Corporation Environmental Testing Laboratory of Electric Operation Management Co., Ltd.

This standard was approved by the Ministry of Ecology and Environment on December 10, 2020.

This standard shall come into effect on January 1, 2021.

This standard is interpreted by the Ministry of Ecology and Environment.

1 Determination of gamma radionuclide in ambient air aerosol

Membrane compression/gamma spectroscopy

1 Scope of application this standard specifies the method for the determination of gamma radionuclides in ambient air aerosols by filter membrane compression/gamma spectroscopy.

This standard is applicable to routine monitoring of radiation environment and determination of gamma radionuclide in ambient air aerosol.

When the sampling volume is 10000 m³ (standard state) and the measurement time is 24 hours, the detection of each gamma radionuclide determined by this standard the lower limit is 5μBq/m³~100μBq/m³, and the detection limit is shown in Appendix A.

2 Normative references

The content of this standard refers to the following documents or their clauses. For undated reference documents, their valid versions are applicable to this standard.

GB/T 11713 High-purity germanium gamma-energy spectrum analysis general method

GB/T 11743 Analytical method of radionuclides in soil by gamma energy spectrum HJ 1009

Technical Specification for Operation of Automatic Radiation Ambient Air Monitoring Station

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1 Aerosol

Liquid or solid particles are dispersed in the air to form a relatively stable suspension system.

3.2 Standard state

The temperature is 273.15 K and the pressure is 101.325 kPa. The activity concentration of radionuclide in this standard is under standard state the activity concentration.

4 Principle of the method

A quantitative volume of air is extracted through a large flow or super large flow sampler, so that aerosol particles in the air are trapped on the filter membrane.

The composition and concentration of the gamma radionuclide were analyzed by a high-purity germanium gamma spectrometer after being compressed.

5 Reagents and materials

5.1

Filter membrane. When the membrane surface velocity is 0.6 m/s, the retention efficiency of 0.3μm standard particles is not less than 95%. Clean air flow rate at 0.6 m/s when the pressure drop is less than 1 kPa. The content of natural radionuclides is low and there is no artificial radioactive pollution. Easy to press, the surface is smooth after pressing, not easy Deformed. If further radiochemical analysis is required, it should have complete solubility.

5.2

Sample container. cylindrical container with diameter and height similar to the sample after pressing. Use natural radionuclides with low content and no artificial radiation Made of sexually contaminated materials, such as ABS resin or polyethylene.

5.3

Energy calibration source. performance and technical indicators comply with the provisions of GB/T 11713 on calibration sources.

25.4 Efficiency calibration source. Take the blank filter membrane as the matrix, smear it evenly with radioactive standard materials, and prepare it in the same way as the blank sample A cylindrical calibration source with the same diameter and height as the sample is put into the sample container and fixed and sealed. Performance and technical index execution According to the relevant regulations of GB/T 11713, it is recommended to give priority to the use of nuclides that emit single-energy gamma rays.

5.5

Test source. Long-life, high-, middle- and low-energy regions have at least one calibration source of characteristic gamma rays. The activity is similar to the efficiency calibration source.

It can implement the regulations of GB/T 11713 about calibration source with technical indicators.

5.6

Filter membrane storage bag. polyethylene and other materials.

5.7

Anti-fouling products. bags or films made of polyethylene and other materials.

5.8

Disposable gloves. materials such as polyethylene.

6 Apparatus and equipment

6.1

Aerosol sampler. performance and technical indicators comply with HJ 1009 regulations on sampling equipment.

6.2

gamma energy spectrometer. In addition to the performance and technical specifications of GB/T 11713, the relative detection efficiency of the detector should generally not be small Less than 30%.

6.3

Balance. a sense of 0.01g.

6.4

Drying equipment. dryer, drying oven, etc.

6.5

Tablet press. can provide not less than 10 tons of pressure.

6.6

Tablet press mould. stainless steel material.

6.7

Vernier caliper. 0 mm~150 mm, graduation value 0.1 mm.