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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 11713-2015

Replacing GB 11713-1989

General analytical methods of high-purity germanium gamma spectrometer

高纯锗γ能谱分析通用方法

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Standardization Administration of China

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Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules.

This standard replaces GB 11713-1989 "semiconductor gamma spectrometer analysis is lower than the standard method of activity gamma radioactive samples." This standard

Compared with GB 11713-1989, the main technical changes are as follows.

--- Standard name was changed to "high purity germanium gamma spectrum analysis of the general method";

--- By the mandatory nature of standards instead recommended;

--- Modify the probe used for the measurement of HPGe detectors, and modify the energy resolution and detection efficiency and other relevant parameters Claim;

--- Increasing the intrinsic detection efficiency, the relative detection efficiency and minimum detectable limit of three terms;

--- Modified gamma spectrometer for high-voltage, spectrum amplifiers, multi-channel pulse amplitude analyzer requirements;

--- Added "calibration source traceability";

--- Increasing the calculation method of energy calibration curve;

--- Added Appendix C "gamma spectrometer calibration source preparation."

This standard is proposed and managed by the National Health and Family Planning Commission People's Republic of China.

This standard was drafted. Chinese Center for Disease Control Radiation Protection and Nuclear Safety, Central Hainan Disease Control and Prevention, Kyrgyzstan

Forest University School of Public Health.

The main drafters of this standard. Xu Cuihua, Zhao, Zhou Qiang, extension fly, Wangchuan Jian, Lu Yan, Zhang Qing, Ren Tian, \u200b\u200bZhang Jing, Li Hong, Zhang Jianfeng.

This standard was first released in September 1989.

General purity germanium gamma spectrum analysis method

1 Scope

This standard specifies the use of high-purity germanium (HPGe) gamma spectrometer analysis of the general method of sample gamma radionuclides.

This standard applies to the measurement in the laboratory analysis of gamma-ray energy above 40keV and characteristic lines can tell apart gamma radionuclides.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1 Intrinsic detection efficiency intrinsicdetectionefficiency

To represent the performance parameters of the detector itself. It is equal to the number of pulses recorded incident on the detector sensitive gamma photon number within the volume of ratio.

2.2 Relative detection efficiency relativedetectionefficiency

When the former source to the probe surface distance of 25cm, HPGe detector and standard cylindrical NaI (Tl) scintillation crystal (phi x h.

7.62cm x 7.62cm) detector measures the ratio of 60Co source 1332.5keVgamma ray total absorption peak area.

Nuclide total absorption peak detection efficiency totalabsorptiondetectionefficiencyfornuclide

For a given measurement conditions and the energy of the nuclide emitted radiation Egamma gamma characteristic, the net count detected within the entire absorption peaks within

The number of radiation sources within the same time interval in the ratio of total decay of

the nuclides.

gamma-ray total absorption peak detection efficiency
totalabsorptiondetectionefficiencyforgamma-ray

For net count and at the same time a given measurement conditions and gamma-ray energy, the total absorption peak is detected within the interval radiation source

gamma-ray ratio of the total energy.

2.5 Background background

When no test radiation source (sample), other factors, such as cosmic rays, radioactive contamination, electromagnetic interference in the studied energy range of the spectrum Resulting count.

2.6 Full peak full width at half fulwidthathalfmaximum; FWHM

Only the upper constituted unimodal distribution, the peak (maximum) at half the full width (distance between two points between the horizontal axis), the half-width.

2.7 Energy resolution energyresolution

Energy resolution of the detector different but very similar incident gamma rays. Energy resolution gamma-ray energy incident related to

Specified monoenergetic gamma-ray energy, the energy of Full absorption peak of the full width at half represented.

2.8 Compton scattering interference disturbancefromComptonscattering

A plurality of radiation-emitting energy gamma-rays, where higher energy gamma-ray Compton scattering count on lower energy gamma-ray absorption whole