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**Nanotechnology - Nano-biological effects of nanomaterials -
NMR-based metabolomics**

纳米技术 纳米生物效应代谢组学方法 核磁共振波谱法

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Table of Contents

- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 Abbreviations
- 5 Principle
- 6 Instruments

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard proposed by the Chinese Academy of Sciences. This standard by the National Institute of Technology Standardization Technical Committee (SAC/TC279) centralized. This standard drafting unit. Chinese Academy of Sciences Wuhan Institute of Physics and Mathematics, National Nanoscience and Technology Center. The main drafters of this standard. Zhang Limin, Wang Yulan, Tang Huiru, Wu Xiaochun.

Nanomaterials can enter the organism through many ways, such as breathing, ingesting, direct or indirect skin contact, etc., Sub-levels affect the organism, causing metabolic changes in the organism. Therefore, it can be evaluated by the changes of metabolome of organism caused by the exposure of nanomaterials Biological effect of nanomaterials. Metabolomics is based on group analysis of indicators, high-throughput detection and multivariate statistics Analysis as a means to mathematical models and systems integration as the goal of the discipline, is a branch of system biology, has been widely used in swollen Tumor, gastrointestinal diseases, metabolic diseases and toxicology and other fields. At present metabolomics test methods are mainly chromatography-mass spectrometry and Nuclear magnetic resonance spectroscopy, the standard developed based on nuclear magnetic resonance spectroscopy to detect and used to evaluate the biological effects of nanomaterials metabonomics analysis method. Nanotechnology Nanobiotic Effects Metabonomics Methods Nuclear magnetic resonance spectroscopy

1 Scope

China's national standard for using nuclear magnetic resonance metabolomics to detect the biological effects of nanomaterials. It specifies the NMR detection method for metabolic changes in organisms caused by exposure to nanomaterials, and it applies to the evaluation of the biological effects of nanomaterials. Metabolomics measures the small molecules an organism produces - the sugars, amino acids, organic acids and lipids that

are the output of its metabolism - and reads their pattern as a description of physiological state. Its appeal for nanotoxicology is that it does not require a hypothesis. Conventional toxicology asks whether a specific marker of a specific organ has moved; metabolomics asks what has changed, and lets the answer point at the mechanism. That suits a field where the material is new, the mechanism is unknown and the effect may be subtle. NMR is the method chosen here because it is quantitative, reproducible between laboratories and non-destructive, which matters more for a standard than the greater sensitivity of mass spectrometry.

This standard specifies the nuclear magnetic resonance detection method of nano-material exposure caused by changes in the metabolism of organisms. This standard applies to biological effects of nano-materials evaluation.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version applies to this article Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 13966 analytical instruments terminology

GB/T 19619 nanomaterials terminology

3 Terms and definitions

GB/T 13966 and GB/T 19619 and defined by the following terms and definitions apply to this document.

3.1 Metabolomics metabonomics; metabolomics Metabolites in vivo analysis of the group, and the establishment of metabolites and physiological and pathological changes in the correspondence between the omics method [1].

3.2 Nanomaterials exposed nanomaterialsexposure Nanomaterials are in full contact with the population or with experimental cells and animals.

5 Principle

Proton NMR was used to detect biological samples exposed to nanomaterials, and multivariate statistical analysis of metabolomics Changes in content, thus assess the biological effects of nano-materials.

6 Instruments

6.1 High-resolution nuclear magnetic resonance spectrometer NMR spectrometer with proton resonance frequency above 500MHz, see Appendix B for parameter optimization.