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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 39990-2021

Particulates - Bioaerosol samplers - Technical specification

颗粒 生物气溶胶采样器 技术条件

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Preview: page 1 of 5 shown, 22 in the full document. Complete English PDF, instant download:
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Table of Contents

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Preview: page 2 of 5 shown, 22 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-t-39990-2021

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1 Scope

China's national technical specification for bioaerosol samplers. It specifies the terms and definitions and the classification, composition and working requirements. The specification follows the general principles standard and addresses the instrument rather than the method. The types differ fundamentally in how they capture and in what they preserve: impactors accelerate the air and slam particles onto a plate or a culture medium, which is efficient and damaging; impingers draw the air through liquid, which is gentler and allows the sample to be split for several analyses; filters are simple and dry the organisms during sampling; and cyclones concentrate into a small liquid volume. Each has a cut-off size below which it collects nothing, and each has a preservation efficiency that determines how much of what it caught is still viable - which is why the specification has to state both rather than a single collection efficiency.

This Standard specifies the classification, composition, working conditions, technical requirements, test conditions, test methods, inspection regulations, marking, packaging, transportation and storage of bioaerosol sampler. This Standard is applicable to development, production and inspection of bioaerosol sampler.

2 Normative References

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 3768 Acoustics - Determination of Sound Power Levels and Sound Energy Levels of Noise Sources Using Sound Pressure - Survey Method Using an Enveloping Measurement Surface over a Reflecting Plane

GB/T 11463 Reliability Test for Electronic Measuring Instruments

GB/T 38517-2020 Particulate - Bioaerosols Sampling and Analysis - General Principles

Preview: page 3 of 5 shown, 22 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-t-39990-2021

3 Terms and Definitions

What is defined in GB/T 38517-2020, and the following terms and definitions are applicable to this document.

3.1 Sampling Airflow Ratio Sampling airflow ratio refers to the volume of gas passing through the bioaerosol automatically controlling the start and stop of sampling; the time control is accurate to the second. It shall be possible to store the sampling time information in the sampling information record and storage unit.

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4.2.5 Sampling information record and storage unit

4.2.5.1 The sampler shall be able to automatically measure and display the instantaneous airflow ratio and sampling time; the display update time shall not exceed 5 s. The cumulative working condition sampling volume and the standard condition sampling volume shall be calculated once in at least 1 min.

4.2.5.2 The sampling information record and storage unit shall at least be able to record and store information, such as: sampling date, sampling time, ambient temperature, ambient atmospheric pressure, sampling No., sampling airflow ratio, sampling volume and standard condition sampling volume, etc.

4.2.5.3 It shall be able to transmit the stored record information to a computer or other carriers for query or printing, and the data shall be stored for at least 3 months.

4.3 Working Conditions

4.3.1 Ambient temperature: -10 °C ~ 50 °C.

4.3.2 Ambient humidity: relative humidity is not greater than 85%.

4.3.3 Atmospheric pressure: 80 kPa ~ 106 kPa.

5 Technical Requirements

5.1 Sampling Efficiency The sampling efficiency shall be not less than 70%. In addition, the corresponding particle size range shall be marked.

5.2 Survival Rate of Microbial The survival rate of microbial shall be not less than 70%. In addition, the reference sampler type in the test shall be marked.

5.3 Sampling Airflow Ratio

5.3.1 The indication error of the sampling airflow ratio shall not exceed ± 5%.

5.3.2 The repeatability of the sampling airflow ratio shall not be greater than 2%.

Preview: page 4 of 5 shown, 22 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-t-39990-2021

5.3.3 The stability of the sampling airflow ratio shall not exceed 5%.

6.2.6 Aerodynamic particle size spectrometer The maximum allowable indication error is: ± 30%FS.

6.2.7 Fluorescence spectrophotometer The maximum allowable indication error of wavelength is: ± 2 nm.

6.2.8 Aerosol generator 0.5 μm ~ 15 μm particles can be generated.

6.2.9 Constant-temperature biochemical incubator The temperature deviation is: ± 1.0 °C.

6.2.10 Reference standard sampler Andersen six-stage sampler air microbial sampler or AGI-30 air microbial sampler, with a sampling efficiency of not less than 70%.

6.3 Reagents or Materials

6.3.1 Monodisperse fluorescent polystyrene microspheres The sizes of the microspheres are respectively: 1 μm, 3 μm, 5 μm and 10 μm; the coefficient of variation is 3% ~ 5%.

6.3.2 Indicator microorganisms for inspection Certified standard substance of Serratia marcescens, certified standard substance of bacteriophage PHiX174 and certified standard substance of Bacillus atrophicus.

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7.1 Sampling Efficiency

7.1.1 In the aerosol laboratory shelter, the sampling ports of the sampler to be tested and the filter membrane-type sampler have the same height, and the distance from the aerosol inlet is

0.5 m ~ 1 m. Use the aerosol generator to generate 1 μm monodisperse fluorescent microsphere aerosol. 5 min after generation, use an aerodynamic particle counter to respectively measure the concentration of aerosol particles at the sampling ports where the sampler to be tested and the filter membrane-type sampler are located.

7.1.2 After the two measured concentrations reach the same level, simultaneously turn on the sampler to be tested and the filter membrane-type sampler for aerosol sampling for 5 min. to culture and count the collected samples, so as to obtain the number of viable microorganisms collected by each sampler. The number of biological particles collected by the sampler to be tested is Ntest-vc; the sum of the number of biological particles collected by the sampler to be tested and the number of biological particles collected by the filter membrane-type sampler on the gas circuit is the total number of biological particles on the gas circuit Ntext-tot. The number of biological particles collected by the reference standard sampler is Nref-vc; the sum of the number of biological particles collected by the reference standard sampler and the number of biological particles collected by the filter membrane-type sampler on the gas circuit is the total number of biological particles on the gas circuit Nref-tot.

Preview: page 5 of 5 shown, 22 in the full document. Complete English PDF, instant download:
https://chinastandards.org/standards/gb-t-39990-2021