NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 39104.1-2020

Textiles - Determination of antifungal activity of textile products - Part 1: Luminescence method

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1 Scope

This Part of GBT 39104 specifies the quantitative test method for determining the antifungal activity of textiles through the luminescence intensity generated by an enzymatic reaction [adenosine triphosphate (ATP) method].

This Part is applicable to various types of textile products, such as: fibers, yarns, fabrics, clothing, bedclothes, home furnishings and other textile products.

2 Normative References

The following documents are indispensable to the application of this document. 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 20944.2-2007 Textiles - Evaluation for Antibacterial Activity - Part 2: Absorption Method

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Control Fabric

Control fabric refers to a fabric used to validate the growth conditions of test fungus.

NOTE: the control fabric can be taken from textiles of the same texture as the specimen but without antifungal treatment. If the above-mentioned specimen cannot be obtained, use 100% cotton fabric without fluorescent brighteners or other finish as the control fabric; before use, in accordance with the stipulations of GB/T 8629, at 60 ?C, without adding any detergents or brighteners, perform cyclic washing for 10 times; for each cycle, wash for 10 min and rinse twice for a total of 5 min.

3.2 Antifungal Agent

Antifungal agent refers to an adjuvant that inhibits or slows down the growth of fungus or reduces the number of fungus.

3.3 Antifungal Treatment

Antifungal treatment refers to a treatment that inhibits or mitigates the growth of fungus or reduces the number of fungus.

3.4 Spore Suspension

Spore suspension refers to a liquid, in which fungal spores are uniformly dispersed in sterilized water containing an anionic surfactant.

3.5 Adenosine Triphosphate; ATP

Adenosine triphosphate refers to a multi-functional nucleotide present in living fungi.

3.6 Antifungal Activity

Antifungal activity refers to an activity of inhibiting or slowing down the growth of fungus, which is characterized by the difference between the growth values expressed by the logarithm of ATP in the control fabric and the test specimen.

3.7 Luminescence Method

Luminescence method refers to a method of determining the amount of ATP in fungal cells.

NOTE: the result is expressed in moles of ATP.

4 Principle

Respectively use the spore suspension of the test fungus to inoculate the test specimen and the control fabric. In addition, under the condition of 25 ?C, incubate it for 42 h. By comparing the determination results of the luminescence intensity of intracellular ATP of the fungus on the test specimen and the control fabric, quantitatively determine the fungal growth value or antifungal activity.

5 Safety Precautions

This Method requires the use of fungi. The test shall be performed by personnel trained and experienced in microbiological techniques. National laws, regulations and recommended norms related to appropriate safety precautions shall be followed.

6 Test Fungi

The test fungal strains shall be selected from Table A.1 of Appendix A.

With the consent of the related sides, equivalent fungal strains provided by other culture collection institutions affiliated to the World Federation for Culture Collection (WFCC) may be taken as a replacement.

7.22 Ultrasonic cleaner: the compact type for experiments, with a frequency of approximately

30 kHz ~ 50 kHz.

7.23 Luminometer: the test wavelength is 300 nm ~ 650 nm. Under the analytical conditions

specified in 8.4 and Chapter 11, it is capable of ATP measurement at the concentration of 1 ? 10-8 mol/L ~ 1 ? 10-5 mol/L.

7.26 Freezers: one capable of adjusting the temperature to below ? 80 ?C, and the other capable

of adjusting the temperature to below ? 20 ?C.

Test tubes, glass vials, flasks, pipettes and tweezers shall be carefully washed with an alkaline or neutral detergent, rinsed and dried; before use, they shall be processed through dry sterilization or high-pressure steam sterilization.

8.1 General

The reagents used for the test shall be analytically pure and / or suitable for microbiological testing.

The existing commercial dehydration products should be used to prepare the culture media. In addition, the instructions for use provided by the manufacturers of relevant products should be strictly followed.

8.2 Pure Water

Analytical-grade pure water used for the preparation of microbial culture media and reagents.

It shall be obtained through distillation, ion exchange, ultrafiltration and / or reverse osmosis (RO) device filtration; it shall be free from toxic or fungus-inhibitory substances.

8.3 Anionic Surfactant

Dioctyl sodium sulfosuccinate, used to prepare the spore suspension.

8.4.1 General

In accordance with the stipulations of 8.4.2 ~ 8.4.8, prepare reagents and buffer solutions. They may be replaced by appropriately validated commercial reagents.

---Use the Pasteur pipette (7.13) or an equivalent device to pipette 0.5 mL of the sterilized water containing anionic surfactant (8.4.8) (Step 1);

---By 5 times, disperse it into the spores in the center of the agar plate; slowly wash the surface (Step 2).

NOTE: minor adjustments are acceptable, for example, increasing the amount of washing water.

Under this circumstance, keep records of all conditions.

10.3 Collection and Dispersion of Spore Suspension from a Culture Medium See the steps below:

---Use the Pasteur pipette (7.13) or an equivalent device to pipette the spore suspension in 10.2;

---Transfer it into about 5 mL of the sterilized water containing anionic surfactant (8.4.8);

---Pipette about 100 times, or use a test tube agitator to agitate it, or perform light ultrasonic cleaning for 5 min, so that the spores can be thoroughly dispersed;

---Visually observe that the suspension appears slightly cloudy (Step 3).