3. Antibacterial Power Sustainability Test Methods for Antibacterial Products (2012 Version)

(2) Light Fastness Test

1. Outline

An antibacterial product conferred with an antibacterial function (hereinafter simply referred to as a product) can lose antibacterial power due to degeneration or deterioration of the antibacterial ingredients on its surface when exposed to light (particularly ultraviolet rays). With this in mind, an accelerated test is performed under exposure conditions specified for each product category to prepare a test piece[1]. Using the prepared test piece, an antibacterial power test is performed to evaluate the sustainability of the antibacterial power (waterproofing performance) of the product.

2. Procurement of Supplies

The following instrumentation and equipment shall be provided. The reagents, instruments and other supplies used in this test method shall be in conformity with the Japan Industrial Standards or the Japanese Pharmacopoeia unless otherwise specified.

In addition to the items shown below, instruments etc. shall be provided as required.

(1) Light fastness tester[2] (xenon arc lamp type tester JIS B 7754 or Sunshine carbon arc lamp type, JIS B 7753 compliant)
(2) Desiccator
(3) Dryer (air bath)
(4) Others

3. Preparation of Test Pieces

The test piece[3] subjected to this test shall, as a rule, be an actual supply of the product as is. However, provided that it is prepared using the same method of treatment, and is judged to produce similar levels of antibacterial power even if it has a different shape from that of the product, it may be used as the test piece. The test piece may be cut to the desired size either after or prior to a light fastness test. Described below is how to prepare a test piece previously cut into a size suitable for the antibacterial power test.

(1) Provide six test pieces cut into 50±2 mm square (thickness not more than 10 mm) standard pieces and use these as the antibacterial test pieces[4].

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[1] The test piece subjected to the antibacterial power test of an antibacterial product shall, as a rule, be a test piece obtained by this test method.

[2] The name of the light fastness tester used shall be specified in the Test Results section.

[3] Provided that this test method is difficult to apply to prepare a test piece due to a special shape of the product and the like, a sample prepared by another method of treatment deemed to produce nearly the same results for antibacterial power may be used as the test sample. If a non-actual supply of the product is used as the test piece, however, the fact shall be stated in the Test Results section.

[4] The thickness of the test piece shall be up to 10 mm to allow easy entry into a Petri dish. If the thickness exceeds 10 mm, the test piece shall be sliced to obtain a thickness of less than 10 mm. In this case, be sure to reserve the original surface of the test piece, and to perform the test on this reserved surface. Regarding the size of the test piece, the test piece may be rectangular, provided that its area is constant. However, the test piece size should not be less than a quarter of the original area. If a standard test piece area cannot be assured because of the size of the test piece and the like, the size of the test piece shall be indicated. In the antibacterial power test after preparation of the test pieces, use three test pieces (6 in total) for each of the bacteria *Staphylococcus aureus* NBRC 12732 (ATCC 6538P) and *Escherichia coli* NBRC 3972 (ATCC 8739).

(2) Provide twelve untreated samples, previously cut to the same size as the test pieces, and use these as the untreated test pieces[1].

4. Test Procedures

Proceed as directed below.

The operating conditions for the light fastness tester shall be established according to the intended use of the product with reference to the three categories shown in Table 2 [2].

(1) Attach the sample holder with the test piece on to the sample rotation frame[3].

(2) Operate the apparatus under the conditions specified for the product for the test piece, and irradiate light for the specified time[4].

(3) When the cumulative exposure time has reached the time specified for the product, remove the test piece. If the test piece surface is wet, drain and allow to stand for 1 hour or more, then immediately perform the antibacterial power test.

If the antibacterial power test cannot be performed immediately, keep the test piece in dry state in a desiccator or dryer (air bath) [5]. If it is impossible, the test piece may be kept in a container that does not influence its quality, such as a glass Petri dish.

[1] An untreated sample refers to a product not undergoing antibacterial treatment, and must be prepared with the same material using the same method of treatment as those for the test piece.

[2] The test may be performed for a category higher than the category specified for the product shown in the table. If the test is performed under conditions other than those for the category for the product, the conditions may involve higher energy and longer exposure time than the test conditions specified for the category of the product. The category applied in the light fastness test shall be indicated. If the test is performed under test conditions (light source and irradiation time) other than those categorized in Table 2, the fact and the test conditions used shall be indicated.

[3] Set the test piece so that the antibacterial power test surface is the surface to be irradiated, being careful to avoid using the wrong side. Do not change the position of the test piece sample holder.

[4] This test method, unlike a weatherbility test, does not always require a step for water spraying. The temperature range setting for the black panel thermometer shall be between 50 and 70°C (63±3°C chosen for reference) in view of thermal deterioration that can affect test results.

[5] The temperature range shall be between 30 and 40°C.

5. Standard Test Conditions and Categories

The following two standard conditions for the product specifications for the light fastness test shall be established.

(1) Tester model name (light source conditions etc.)
(2) Exposure time (hr)

Regarding product categorization for the light fastness test, intended uses of products are divided into three categories in view of the degree of light exposure to the product. The categories and exposure conditions are shown in Table 2.

Table 2 Product categories for light fastness test and exposure conditions

Category	Exposure time (hr) by type of tester		Applicability (range)
	Xenon ($60w/m^2$)	Direct sunlight	
0	Not performed		Products that do not require consideration of occasions of light exposure (disposable products etc.)
1	10	8	Products unlikely to be used under light (products for indoor use etc.)
2	100	80	Products often exposed to light (products for constant outdoor use, lighting appliances, etc.)

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