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Colorfastness to Perspiration and Light

Developed in 1967 by AATCC Committee RA23; jurisdiction transferred in 1996 to AATCC Committee RA50; reaffirmed 1971, 1974, 1978, 1989, 1991; revised 1982, 2004 (with title change), 2013; editorially revised and reaffirmed 1986, 2009; editorially revised 1990, 1993, 1996, 2005, 2010, 2014. Partially equivalent to ISO 105-B07.

1. Purpose and Scope

1.1 The purpose of this method is to determine the effect of the combination of perspiration solution and light exposure on the colorfastness of a colored textile specimen. Therefore, only perspiration solutions will be used in this procedure.

2. Principle

2.1 A colored test specimen is immersed in a perspiration test solution for a specified period of time and immediately exposed to light in a fading apparatus for a specified period of time.

2.1.1 Fading apparatus will be the xenon-arc lamp test apparatus as described in AATCC Method 16.3, Colorfastness to Light: Xenon-Arc.

3. Terminology

3.1 **colorfastness**, *n.*—the resistance of a material to change in any of its color characteristics, to transfer of its colorant(s) to adjacent materials or both, as a result of the exposure of the material to any environment that might be encountered during the processing, testing, storage or use of the material.

3.2 **lightfastness**, *n.*—the property of a material, usually an assigned number, depicting a ranked change in its color characteristics as a result of exposure of the material to sunlight or an artificial light source.

3.3 **perspiration**, *n.*—a saline fluid secreted by the sweat glands (in this test an artificial perspiration solution will be used).

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific

details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

5. Apparatus, Materials and Test Solutions

5.1 Xenon-arc lamp fading apparatus (see AATCC Method 16.3, Option 3)

5.2 Balance with a weighing accuracy of 0.0001 g.

5.3 pH meter accurate to 0.01.

5.4 Cardboard: 41 kg (91 lb) White Bristol Index (no backing of exposed area of colored test specimen).

5.5 Acid perspiration solution (see 12.4).

5.6 Gray Scale for Color Change (AATCC Evaluation Procedure 1) (see 12.1).

5.7 White AATCC Textile Blotting Paper (see 12.1).

5.8 Wringer (see 12.5).

6. Preparation of Reagent

6.1 Acid Perspiration Solution.

6.1.1 Prepare the acid perspiration solution by filling a 1 L volumetric flask half full of distilled water. Add the following chemicals and mix to be sure that all chemicals are thoroughly dissolved:

10 ± 0.01 g sodium chloride (NaCl)

1 ± 0.01 g lactic acid, USP 85%

1 ± 0.01 g disodium hydrogen phosphate, anhydrous (Na₂HPO₄) (see 12.2)

0.25 ± 0.001 g L-histidine monohydrochloride (C₆H₉N₃O₂·HCl·H₂O)

Fill the volumetric flask with distilled water to the 1 L mark.

6.1.2 Test the pH of the solution with a pH meter. If it is not 4.3 ± 0.2 discard it and prepare a new one, making sure all ingredients are weighed accurately. The use of pH test paper is not recommended for this purpose because of its lack of accuracy.

6.1.3 Do not use perspiration solution that is more than three days old (see 12.3).

7. Test Specimens

7.1 Cut a specimen of colored fabric 5.1 × 7.0 cm (2.0 × 2.75 in.).

8. Procedure

8.1 Weigh the specimen to ± 0.01g.

8.2 Place each test specimen (as pre-

pared in 7.1) in a 9 cm diameter, 2 cm deep petri dish. Add freshly prepared perspiration solution to a depth of 1.5 cm in the petri dish. Soak the test specimen in the solution for 30 ± 2 min with occasional agitation and squeezing to ensure complete wetting. For fabrics hard to wet out, alternately wet the specimen and pass through a laboratory wringer until it is completely penetrated by the solution.

8.3 After 30 ± 2 min, pass each test specimen through the wringer with the multifiber stripes perpendicular to the length of the wringer rolls (all stripes go through the wringer at the same time) or press between White AATCC Textile Blotting Paper such that each test specimen weighs 200 ± 5% its original weight (e.g., if the original specimen weighed 10 g, it should weigh between 19.5 and 20.5 g after soaking and wringing).

8.4 Mount wet, unbacked specimen in exposure frame or mount specimen on white cardboard stock that has been wrapped with a thin plastic film (see 12.6) to prevent wetting of the backing.

8.5 Expose specimens in fading apparatus in accordance with AATCC Method 16.3, Option 3 for 20 AFUs.

8.6 Remove the specimens.

9. Evaluation

9.1 Evaluation of color change.

9.2 Evaluate the change in color in the test specimen by comparison with the Gray Scale for Color Change (AATCC Evaluation Procedure 1), or using AATCC Evaluation Procedure 7, Instrumental Assessment of the Change in Color of a Test Specimen, and record the numerical rating that corresponds to the appropriate one on the Gray Scale (see 12.1).

9.3 For improved precision and accuracy more than one rater should rate the specimens.

10. Report

10.1 Report the color change grade.

10.2 Report the Fading apparatus used.

10.3 Report the reagent used.

11. Precision and Bias

11.1 *Precision.* In 2002 a single laboratory study was performed using a single operator. This study was intended to be a temporary table of variances to give some indication of test variability. A complete interlaboratory study is to be conducted