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Colorfastness to Acids and Alkalis

Developed in 1925 by AATCC Committee RR1; revised 1945, 1952, 1957; reaffirmed 1972, 1975, 1978, 1989, 2006, 2011; editorially revised and reaffirmed 1981, 1986, 1994, 2001; editorially revised 1995, 2004, 2010. Related to ISO 105-E05 and E06.

1. Purpose and Scope

1.1 Test specimens are evaluated for resistance to simulated action of acid fumes, sizes, alkaline sizes, alkaline cleansing agents and alkaline street dirt. These test methods are applicable to textiles made from all fibers in the form of yarns or fabrics, whether dyed, printed or otherwise colored.

2. Principle

2.1 The specimens are steeped in or spotted with the required solutions by means of simple laboratory equipment. The tested specimens are examined for changes in color.

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.

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.

4.2 All chemicals should be handled with care. Use chemical goggles or face shield, impervious gloves and an impervious apron during dispensing and mixing of hydrochloric acid, acetic acid and ammonium hydroxide.

4.3 An eyewash/safety shower should be located nearby and a self-contained breathing apparatus should be readily available for emergency use.

5. Apparatus, Materials and Reagents

5.1 Beaker, 250 mL.

5.2 Bell jar, 4 L, with a glass plate base.

5.3 Evaporating dish.

5.4 Gray Scale for Color Change (AATCC Evaluation Procedure 1) (see 11.1).

5.5 Hydrochloric acid (HCl), 35%.

5.6 Acetic acid (CH₃COOH), 56%.

5.7 Ammonium hydroxide (NH₄OH), anhydrous ammonia 28% (NH₃).

5.8 Sodium carbonate (Na₂CO₃), anhydrous, technical.

5.9 Calcium hydroxide [Ca(OH)₂], freshly prepared paste.

6. Test Specimens

6.1 These may be cut in any convenient size.

7. Procedure

7.1 Acid Tests.

7.1.1 Spot the specimen with the hydrochloric acid solution (100 mL of 35% acid made up to 1 L, add acid to water) at 21°C (70°F), and then dry the specimen at room temperature without rinsing.

7.1.2 Spot the specimen with acetic acid (56%) and dry it at room temperature without rinsing.

7.2 Alkali Tests.

7.2.1 Steep the specimen for 2 min at 21°C (70°F) in ammonium hydroxide (28% anhydrous ammonia) and dry it at room temperature without rinsing.

7.2.2 Steep for 2 min at 21°C (70°F) in sodium carbonate (10%) and dry it at room temperature without rinsing.

7.2.3 Suspend the specimen over a 7.6

cm (3 in.) evaporating dish containing 10 mL ammonium hydroxide (28% anhydrous ammonia) for 24 h in a 4 L bell jar placed on a glass plate.

7.2.4 Spot the specimen with calcium hydroxide, a freshly prepared paste, made by mixing the hydroxide with a small amount of water, and dry the specimen. Then brush the specimen to remove the dry powder.

8. Evaluation

8.1 Evaluate the change in color in each 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 11.1).

9. Report

9.1 In reporting results of these tests, state the reagent used as given in the following example:

"This material is in Grade...with respect to colorfastness to hydrochloric acid, etc."

10. Precision and Bias

10.1 *Precision.* Precision for this test method has not been established. Until a precision statement is generated for this test method, use standard statistical techniques in making any comparisons of test results for either *within-laboratory* or *between-laboratory* averages.

10.2 *Bias.* The colorfastness to acids and alkalis can be defined only in terms of a test method. There is no independent method for determining the true value. As a means of estimating this property, the method has no known bias.

11. Note

11.1 Available from AATCC, P.O. Box 12215, Research Triangle Park NC 27709; tel: +1.919.549.8141; fax: +1.919.549.8933; e-mail: orders@aatcc.org; web site: www.aatcc.org.