Test Method for Wetting Agents for Mercerization

Developed in 1941 by AATCC Committee RR8; jurisdiction transferred in 2003 to AATCC Committee RA63; revised 1945, 1952; reaffirmed 1971, 1974, 1977, 1980, 1985, 1989, 1999, 2009, 2013, 2018; editorially revised 1986, 1991, 2008, 2010, 2019; editorially revised and reaffirmed 1994, 2004. Related to ISO 6836.

1. Purpose and Scope

1.1 This test method is applicable only to the evaluation of wetting agents in caustic soda of mercerizing concentration.

2. Principle

2.1 A 25 mm (1 in.) long bundle of cotton yarns composed of 120 ends is carefully dropped onto the surface of a test solution and the time for complete wetting of all ends is determined.

3. Terminology

3.1 **mercerization,** n.—a process for irreversibly altering the physical characteristics and appearance of natural cellulosic fibers by swelling in strong alkali.

3.2 **wetting agent,** n.—a chemical compound which when added to water lowers both the surface tension of the liquid and its interfacial tension against the solid 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 sodium hydroxide.

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

4.4 Exposure to chemicals used in this procedure must be controlled at or below levels set by governmental authorities (e.g., Occupational Safety and Health Administration's [OSHA] permissible exposure limits [PEL] as found in 29 CFR 1910.1000; see web site www.osha.gov for latest version). In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) comprised of time weighted averages (TLV-TWA), short term exposure limits (TLV-STEL) and ceiling limits (TLV-C) are recommended as a general guide for air contaminant exposure which should be met (see 9.1).

5. Apparatus and Materials (see 9.2)

5.1 Beakers, 250 mL.

5.2 Mohr measuring pipettes (0.1 graduation), 1 or 2 mL.

5.3 Volumetric transfer pipettes, 100 mL.

5.4 Stopwatch.

5.5 Scissors.

5.6 Ruler.

5.7 Cotton yarn, greige (unboiled), 40/2 combed *peeler*, preferably in form of chain warp or skein.

5.8 Standard mercerizing penetrant against which comparisons can be made.

5.9 Mercerizing caustic soda with a specific gravity of 48-52% Tw (271-299 g NaOH per liter of soln). Allow to stand several hours (until clear) after preparation.

5.10 Log-log coordinate paper.

6. Procedure

6.1 Into each of three 250 mL beakers measure out 100 mL of the mercerizing caustic soda solution at 26 ± 3°C (78 ± 5°F). Pipette into one beaker 0.75 mL, into the next 1.00 mL and into the third beaker 1.25 mL of the mercerizing penetrant using a suitable small pipette. Mercerizing wetting agents all seem to be liquids. Stir the contents of each beaker until the penetrant is completely dissolved in the caustic soda. These solutions are allowed to stand until all air bubbles have risen to the surface. It should be particularly noticed if the penetrant remains well dispersed or dissolved because the separation of an immiscible layer on the surface would entirely vitiate the results and give false values.

6.2 From the greige (unboiled), 40/2, combed peeler cotton yarn, cut a bundle of 120 parallel ends, 25 mm (1 in.) in length. This bundle of yarn ends is dropped carefully onto the surface of one of the caustic solutions of penetrant, and the time required for complete wetting of all the ends is noted with a stopwatch. The average of five determinations is taken as the sinking time for that concentration.

6.3 In like manner the average sinking time is determined at the other two concentrations for the penetrant under test. Then the average sinking times for the standard at the same three concentrations are determined by the same procedure.

7. Evaluation

7.1 The three average sinking times to the nearest tenth second for the product under test and for the standard are plotted as ordinates on log-log coordinate paper against concentrations of wetting agent in milliliters per 100 mL of caustic soda solution. Straight lines should be obtained when the points are joined.

7.2 The number of milliliters of product under test which are required to give the same wetting time as 1 mL of standard is read from the plot. If the product is either too efficient or too inefficient to obtain a comparison within the range of the volumes already employed, then either a smaller (0.5 mL) or a larger (2.0 or 2.5 mL) volume of the product must be tested. Making the assumption that the standard and the product are reasonably the same in specific gravity, the same wetting effect as 100 parts of standard is obtained from the following formula:

$$x = 100\,v$$

where:

x = parts of product being tested which are equivalent to 100 parts of standard and

v = volume of product in milliliter to give same wetting times as 1 mL of standard.

8. Precision and Bias

8.1 *Precision*. Precision for this test method has not been established. Until a precision statement is generated for this test method, use standard statistical tech-

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niques in making any comparisons of test results for either *within-laboratory* or *between-laboratory* averages.

8.2 *Bias*. Wetting agents for mercerization 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.

9. Notes

9.1 Available from Publications Office, ACGIH, Kemper Woods Center, 1330 Kemper Meadow Dr., Cincinnati OH 45240; tel: +1. 513.742.2020; web site: www.acgih.org.

9.2 For potential equipment information pertaining to this test method, please visit the online *AATCC Buyer's Guide* at www.aatcc.org/bg. AATCC provides the possibility of listing equipment and materials sold by its Corporate members, but AATCC does not qualify, or in any way approve, endorse or certify that any of the listed equipment or materials meets the requirements in its test methods.

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