



Standard Test Method for Differential Dyeing Behavior of Cotton¹

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1. Scope

1.1 This test method covers a test for the characterization of certain dyeing behavior of cotton. This test method is especially applicable to raw cotton fibers, but may also be adapted to cotton yarns and fabrics.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textiles²

D 1441 Practice for Sampling Cotton Fibers for Testing²

3. Terminology

3.1 Definitions:

3.1.1 *differential dyeing behavior, n*—of cotton, the tendency of cotton fibers to absorb and retain selectively varying proportions of different dyes from a binary dye bath.

3.1.2 For definitions of other textile terms used in this test method, refer to Terminology D 123.

4. Summary of Test Method

4.1 Specimens are dyed under specified conditions in a bath containing a mixture of prescribed red and green dyes. The resultant colors are compared with those of cottons of known dyeing behavior or fiber properties.

5. Significance and Use

5.1 This test method is not recommended for acceptance testing because the information obtained is qualitative rather than quantitative in nature (see Section 12).

5.2 The response of fibers to the dye mixture is indicative of the uniformity of dyeing, the probability of dyeing defects due to neps, and the difficulties to be expected from heterogeneity of fibers that differ in dyeing characteristics. In general, the red dye is retained predominantly by the thick-walled fibers and

the green by the thin-walled fibers.

5.3 The color response of the specimens to the dyes in the binary mixture reflects the behavior to be expected with many other dyes. The colors from red to green may be influenced by factors such as weather during the growing period, exposure of open bolls in the field before harvest, natural color, fineness, and degree of wall development.

6. Apparatus

6.1 *Balance*, having a capacity of 1000 g and a sensitivity of 0.05 g.

6.2 *Beakers*, preferably of stainless steel, having capacities of 400, 1200, 2000, and 3000 mL.

6.3 *Clothes Wringer, or Centrifuge*.

6.4 *Cylinders*, graduated, having capacities of 5, 10, 25, 50, 100, and 500 mL or *Burets* (automatic, screw-top, acid-bottle type preferred).

6.5 *Büchner Filter Funnel*, coarse, fritted-disk, 80-mm.

6.6 *Source of Suction*.

6.7 *Sewing Machine, or Needle and Thread*.

6.8 *Timer (with Second Hand), or Stop Watch*.

6.9 *Wiley Mill*, laboratory, intermediate model.

7. Reagents and Material

7.1 Dyes:

7.1.1 *CI Direct Green 26*³ (Color Index No. 34045), 1 g/100 mL stock solution.

7.1.2 *CI Direct Red 81*⁴ (Color Index No. 28160), 0.5 g/100 mL stock solution.

7.2 *Distilled Water*.

7.3 *Sodium Carboxymethyl Cellulose*, low viscosity ("Carbose D")⁵.

7.4 *Sodium Carboxymethyl Cellulose Solution (1 %)*—Dissolve 0.1 g of sodium carboxymethyl cellulose in distilled water and dilute to 100 mL.

NOTE 1—Any commercially available distilled water or water singly distilled in laboratory glassware is acceptable.

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles, and is the direct responsibility of Subcommittee D13.11 on Cotton and Fibers.

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² *Annual Book of ASTM Standards*, Vol 07.01.

³ Solophenyl Green BL, available from Ciba-Geigy Corp., Dyestuffs and Chemical Div., P.O. Box 11422, Greensboro, NC 27409, or equivalent, has been found suitable.

⁴ Diphenyl Red 5 BL, available from Ciba-Geigy Corp., Dyestuffs and Chemical Div., P.O. Box 11422, Greensboro, NC 27409, or equivalent, has been found suitable.

⁵ Available from Carbose Corp., 100 Maple St., Somerset, PA 15501.