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Dispersibility of Disperse Dyes: Filter Test

Developed in 1975 by AATCC Committee RA87; reaffirmed 1976, 1977, 1989, 2006, 2015; revised 1979, 1996, 2011; editorially revised 1980, 1983, 1985, 1987, 1995, 2001, 2004, 2008, 2010; editorially revised and reaffirmed 1984, 1994. Related to ISO 105-Z04.

Table I. Selection of Applicable Test

Test	Whatman Filter Paper Combination	Application of Dyes	pH of Dispersion
I	#2 over #4	Package dyeing of polyester	4.5-5.0
II	#4 over #4	Beck dyeing of polyester	4.5-5.0
III	#4 over #4	Dyeing of nylon carpet and apparel	9.0-10.0

1. Purpose and Scope

1.1 This test determines the dispersibility as evaluated by filtering time and filter residue of disperse dyes under standard conditions in aqueous media. Additional information such as variables which affect accuracy and repeatability of the test are specified in Section 10.

1.2 This test method is to be used for determining the degree of dispersion at the specified conditions in aqueous media only.

2. Principle

2.1 A quantity of disperse dye is diluted, heated and passed through filter papers of specified micron size. The time needed for the dye dispersion to pass through the filter is then recorded.

2.2 Three tests are outlined according to intended dye application (see 10.5 and Table I).

3. Terminology

3.1 **disperse dye**, *n.*—an essentially water insoluble dye having affinity, when properly dispersed, for polyester, polyamide and some other manufactured polymeric fibers.

3.2 **dispersibility**, *n.*—the degree to which particles can be broken down to some minimum size such that they will pass through the interstices of a standard filter paper.

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 and a single use dust respirator while handling powder dyes.

4.2 All chemicals should be handled with care. The compounds used in this test method at the concentrations specified are considered to present no significant hazard when used in accordance with good laboratory practices.

4.3 If concentrated acetic acid is diluted to prepare the 10% acetic acid, use chemical goggles or face shield, impervious gloves and an impervious apron during preparation. Concentrated acids should be handled only in an adequately ventilated laboratory hood. CAUTION: Always add acid to water.

4.4 An eyewash/safety shower should be located nearby and an organic vapor respirator with full facepiece should be readily available for emergency use.

4.5 Exposure to chemicals used in this procedure must be controlled at or below levels set by governmental authorities (e.g., Occupational Safety and Health Administrator'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 10.15).

5. Apparatus and Materials

5.1 Buchner funnel: Coors glazed one-piece porcelain, 110 mm diameter (see 10.2).

5.2 Filter papers: Whatman #2, 110 mm diameter; Whatman #4, 110 mm di-

ameter or exact equivalent filter paper from other sources (see 10.4).

5.3 Stainless steel ring with approximate dimensions 103 mm (4.05 in.) ID, 111 mm (4.33 in.) OD and 8 mm (0.32 in.) height to hold filter paper in place (see 10.6 and 10.12).

5.4 Filtering flask with side tube, capacity 1000 mL.

5.5 Manometer to measure vacuum (pressure drop).

5.6 Vacuum pump or water aspirator to obtain vacuum of 560 ± 100 mm Hg (22 ± 4 in. Hg).

5.7 Vacuum control valve.

5.8 Rubber tubing, vacuum.

5.9 Stopwatch.

5.10 Beakers, 400 mL or larger.

5.11 Balance, analytical.

5.12 Tetrasodium salt of ethylenediaminetetraacetic acid (EDTA) as 25% solution, such as Cheelox BF-12 or equivalent.

5.13 Tetrasodium pyrophosphate, anhydrous (TSPP) ($\text{Na}_4\text{P}_2\text{O}_7$), 10% solution.

5.14 Acetic acid (CH_3COOH), 10% solution.

5.15 Filter Residue Scale (see Fig. 1 and 10.12).

5.16 Distilled or deionized water, which does not change significantly in pH on heating. This water is modified with 0.25 g/L of chelating agent (EDTA) as specified in 5.12.

5.17 Dye samples (see 6.2).

5.18 Stirrer, laboratory, magnetic.

5.19 Graduated cylinder, 250-mL.

5.20 pH meter.

6. Procedure

6.1 Water Preparation.

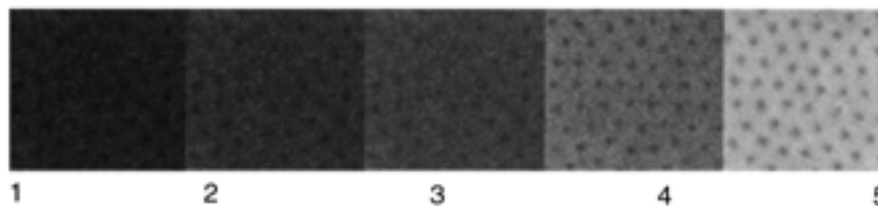


Fig. 1—Filter residue scale.