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Dusting Behavior of Dyes: Determination of

Developed in 1998 by AATCC Committee RA87; reaffirmed 1999, 2000, 2005, 2010, 2014; editorially revised 2008, 2009. Technically equivalent to ISO 105-205.

1. Purpose and Scope

1.1 This test method provides a means to assess the dusting behavior of dyes.

2. Principle

2.1 Dust is generated from a dye sample by means of a dust-generating device, extracted from the dust-bearing air by vacuum and conveyed to a detection point, where the amount of dust generated is estimated visually or determined quantitatively by a gravimetric or photometric option.

3. Terminology

3.1 **dust**, *n.*—fine particles of solid material dispersed in a gas.

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 Follow good laboratory practices. Wear safety glasses in all laboratory areas.

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

5. Uses and Limitations

5.1 Dyestuff dust is formed during handling operations such as dispensing, transferring, sprinkling, etc.

5.2 The dustiness of dyestuffs is an important characteristic when considering aspects of hygiene, health and safety in the dyestuff consuming industry. It is important, therefore, that a reliable and reproducible method exists to measure this property.

5.3 Although other methods of dust measurements exist, the method given in

this test procedure is both more representative of and comparable with actual practice when handling dyestuffs. With respect to a comparison of dyestuffs or the reliability limits, it should be understood that the resulting value is not a specific value like density.

5.4 Solid dyes are sold in different physical forms (powdered, granulated, etc.). The particle-size distribution of commercial products varies considerably. The mean particle diameter may be less than 50 μm or as much as several millimeters. The range of particle-size distribution of a solid dye may also be narrow or wide.

5.5 The particle-size distribution of dyestuff dust is largely independent of the physical form of the dyestuff. Two typical particle-size distributions for dyestuff dust are shown in Fig. 1.

6. Apparatus and Materials (see 13.1)

6.1 Balance, accurate to ± 0.1 g, for weighing the dye.

6.2 Dust-generating device, with filter holder and connecting joints, and incorporating the following additional components (see Figs. 2 and 3, and 13.2).

6.2.1 Filter, white, diameter 50 ± 2 mm, capable of trapping the dust quantitatively (pore size $< 5 \mu\text{m}$), for gravimetric and photometric options made of cellulose acetate nitrate. For the visual option, suitable glass fiber filters can be used.

6.2.2 Vacuum pump with a suction capacity of at least 20 L/min.

6.2.3 Regulator for adjusting the air flow rate.

6.2.4 Flowmeter capable of monitoring the air flow rate between 10-20 L/min.

6.2.5 Timer for opening the slide valve to start suction, and for timing the period of suction.

6.3 Dust assessment apparatus.

6.3.1 For visual option, Gray Scale for Staining (see 13.3 and 13.4).

6.3.2 For gravimetric option, analytical balance.

6.3.3 For photometric option, photometer.

6.4 Analytical balance, accurate to ± 0.01 mg, for weighing the dust collected on the filter (see 6.2.1) (gravimetric assessment option), and/or photometer, for extinction measurement of the dust collected and dissolved in a suitable solvent (photometric assessment option).

6.5 Cleaning device; e.g., brush or vacuum cleaner, for cleaning the apparatus.

6.6 Tweezers for removing filter paper from the holder after dust generation.

7. Procedure

7.1 Place the filter holder with the filter (see 6.2.1) in the dust generating apparatus (see 6.2) and close it to give an airtight fit. If the gravimetric option of assessment is used, condition and weigh the filter before insertion into the filter holder.

7.2 Using the balance (see 6.1), carefully weigh 10.0 ± 0.1 g of the dye and place it in the hopper at the top of the apparatus. Start the timer (see 6.2.5) to open the slide valve with a sudden action, allowing the dye to drop down through the tube into the dust chamber below.

7.3 Five seconds after the slide has opened, apply a vacuum to extract the dust from the chamber for collection on the filter (see 6.2.1) under the following conditions:

7.3.1 Air flow rate: 15 L/min.

7.3.2 Extraction time: 120 s (starting 5 s after dye has dropped).

7.3.3 Height of fall: 815 ± 5 mm.

7.4 Using tweezers (see 6.6), carefully remove the dust-laden filter from the holder and evaluate it by one of the options given in Section 8.

7.5 Clean the equipment thoroughly (see 6.5) after each test. If the equipment is wet-cleaned, take particular care that it is dried thoroughly.

8. Assessment of Filter

8.1 Visual option. Compare the dust-laden filter visually with the Gray Scale for Staining (see 6.3.1) rate the filter using Table I of AATCC Evaluation Procedure (EP) 2, Gray Scale for Staining. Half-grades may be used.

Table I—Dust Assessment Rating Scale

Grade	Description
5	No dust
4	Slightly dusty
3	Moderately dusty
2	Dusty
1	Very dusty

8.2 Gravimetric option. Weigh the dust-laden filter on the analytical balance (see 6.4) to the nearest 0.01 mg. Since with low-dusting products the mass of dust is very small (< 1 mg), considerable errors