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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 2394-2024

Replacing GB/T 2394-2013

**Disperse dyestuffs - Determination of shade and relative
strength**

分散染料 色光和强度的测定

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4 Principle, reagents and apparatus

Clause 4 sets out the comparative principle: the sample and a standard of the same type are dyed or printed under the same conditions on pure polyester textile of standard specification or on diacetate fabric, the colour strength obtained with the standard is taken as 100 points and its shade as the reference, and the sample is then judged against it by eye or by instrument. Four colouring routes are provided: high temperature high pressure dyeing, thermosol dyeing, printing and diacetate fibre dyeing.

Clause 5 requires reagents and materials conforming to Clause 3 of GB/T 2374-2017 and adds the diacetate fibre substrate, a plain woven fabric of 75D by 100D. Clause 6 requires apparatus conforming to Clause 4 of GB/T 2374-2017 and adds a thermosol unit, either a laboratory pad-thermosol line or an electrically heated forced air oven, a small laboratory padder, a small laboratory printing machine, a small laboratory high temperature high pressure dyeing machine and a pH meter. Clause 3 refers the terms and definitions to GB/T 6687.

7.2 High temperature high pressure dyeing method

7.1 The general conditions of dyeing and printing follow GB/T 2374-2017. The colouring route is chosen according to the type and the properties of the dye, the guiding rule being

the highest colour yield; the depth of shade is chosen for the particular product on the rule that the steps between depths stay clearly distinguishable.

7.2.1 Pure polyester yarn or fabric may be pretreated with 2 g/L of scouring agent MA at a liquor ratio of 1 to 50 for yarn and 1 to 100 for fabric, for 10 min at 70 °C to 80 °C, then rinsed, hydroextracted and set aside. 7.2.2 For the dye suspension, a few grams of the sample and of the standard are weighed separately to 0.000 5 g into 400 mL beakers, pasted with a little distilled water, made up with about 200 mL of distilled water and stirred until the dye is dispersed evenly, then transferred to 500 mL volumetric flasks, diluted to the mark and shaken.

7.2.3 The dyeing conditions are the depth of shade laid down by the standard for the particular dye, a fabric mass of 5 g for knitted polyester or polyester yarn or 2 g for polyester cloth, and a liquor ratio of 1 to 20 or 1 to 40 for knitted cloth and yarn and 1 to 100 for plain woven cloth, another ratio being allowed where the dyeing stays even. Table 1 gives the make-up of the dyebath for the example of 2 g of cloth at a liquor ratio of 1 to 100 and a depth of 2 percent on weight of fibre, in millilitres: baths 1 to 3 take 38, 40 and 42 of the 0.5 g per 500 mL standard suspension, baths 4 and 5 take 38 and 40 of the sample suspension, and the distilled water added is 162, 160, 158, 162 and 160 respectively. The quantity of dye rises in proportion where 5 g of fabric is used.

7.2.4 and 7.2.5 The measured volume of suspension is transferred to the dyepot, distilled water is added to the liquor ratio and the pH of each bath is adjusted to 4.0 to 6.0 with acetic acid and sodium acetate. The numbered yarn or fabric is entered in order, the pots are placed in the machine and closed, and the temperature is raised under automatic stirring to 130 °C over 30 min to 60 min, at a pressure of 1.67 by ten to the fifth pascals to 1.76 by ten to the fifth pascals, and held for 40 min to 60 min. Heating is then stopped, the bath is cooled below 80 °C or the steam vented slowly before the machine is opened, and the dyeings are removed, washed well and hydroextracted. Reduction clearing follows: 3.5 mL of 400 g/L sodium hydroxide solution and 2 g of sodium dithionite of 85 percent by mass are dissolved in each litre of water with thorough stirring, and the dyeings are treated at a liquor ratio of 1 to 80 for 15 min at 70 °C, then washed clean, hydroextracted and dried below 100 °C or air dried and finished.

7.3 Thermosol dyeing method

7.3.1 For the thickener, 2.5 g of synthetic gum tragacanth or sodium alginate is weighed to 0.1 g into 1 000 mL of distilled water, stirred thoroughly and left for 12 h; when fully swollen it is filtered through fine cloth and brought to neutral pH with glacial acetic acid.

7.3.2 For the padding liquor, the sample and the standard are weighed to 0.001 g according to the depth of shade into beakers, pasted evenly with 20 mL of distilled water added by pipette, made up with 80 mL of the thickener to 100 mL and stirred until even. Table 2 gives the make-up for the example of a padding liquor at 20 g/L: liquors 1 to 3 take 1.9 g, 2.0 g

and 2.1 g of the standard, liquors 4 and 5 take 2.0 g and 2.1 g of the sample, and each of the five takes 80 mL of the 2.5 g/L synthetic gum tragacanth or sodium alginate and 20 mL of distilled water.

7.3.3 and 7.3.4 The polyester fabric is steeped evenly in the padding liquor for 1 min and padded, then steeped again for 1 min and padded a second time, a pick-up of 65 percent to 70 percent being usual and the pick-up of sample and standard held strictly alike; it is predried to dryness at 90 °C to 100 °C and then thermosoled at 190 °C to 210 °C for 90 s, the exact thermosol temperature being laid down in the product standard. The thermosoled sample is washed well and hydroextracted, and reduction clearing follows 7.2.5.

7.4 Printing method

7.4.1 For the print thickener, 40 g to 50 g of synthetic gum tragacanth or sodium alginate is placed in 1 000 mL of distilled water, heated in a water bath and stirred thoroughly; when fully swollen it is filtered through fine cloth and brought to neutral pH with glacial acetic acid.

7.4.2 Table 3 gives the make-up of the print paste for the example of a printing concentration of 3 percent by mass, in grams unless otherwise marked: pastes 1 to 3 take 2.85 g, 3.00 g and 3.15 g of the dye standard, pastes 4 and 5 take 3.00 g and 3.15 g of the dye sample, each takes distilled water as needed and 50 g to 80 g of the gum tragacanth or alginate paste and 5 mL of 100 g/L penetrant JFC solution, and each is made up with distilled water to a total of 100 g. The kind and the amount of thickener are laid down in the product standard for the dye. In practice the sample and the standard are weighed to 0.000 5 g according to the printing concentration, pasted evenly with a suitable amount of distilled water, mixed with the prescribed amount of thickener, given the 5 mL of penetrant solution and made up with distilled water to 100 g of print paste, stirred thoroughly, left to stand for 15 min and stirred again before printing.

7.4.3 to 7.4.5 The printing machine is set to run normally and the polyester fabric printed, the parameters being kept the same for standard and sample throughout, and the print is dried at 60 °C to 70 °C. The printed cloth is then thermosoled at 190 °C to 210 °C for 90 s, the exact temperature being laid down in the product standard, and is washed well and hydroextracted; reduction clearing follows 7.2.5.

7.5 Diacetate fibre dyeing method

7.5.1 and 7.5.2 The diacetate fibre may be pretreated with 2 g/L of scouring agent MA at a liquor ratio of 1 to 40 for 10 min at 60 °C to 70 °C, then rinsed, hydroextracted and set aside. The dye suspension is prepared as in 7.2.2.

7.5.3 The dyeing conditions are the depth of shade laid down by the standard for the particular dye, generally between one third and full depth, a fabric mass of 2 g of diacetate fabric and a liquor ratio of 1 to 100, another ratio being allowed where the dyeing stays

even. Table 4 gives the make-up of the dyebath for the example of a liquor ratio of 1 to 100 and a depth of 1 percent on weight of fibre, in millilitres: baths 1 to 3 take 38, 40 and 42 of the 0.25 g per 500 mL standard suspension, baths 4 and 5 take 38 and 40 of the sample suspension, and the distilled water added is 162, 160, 158, 162 and 160 respectively.

7.5.4 and 7.5.5 The measured volume of suspension is transferred to the dyepot, distilled water is added to the liquor ratio and the pH of each bath is adjusted to 3.0 to 6.0 with acetic acid and sodium acetate. The numbered diacetate fabric is entered in order and the pots are placed in the machine; under automatic stirring the bath is dyed at 40 °C for 20 min, raised to 85 °C over 45 min to 60 min and held there for 60 min. Heating is then stopped, the bath is cooled below 60 °C and the dyeings are removed, washed well and hydroextracted. Reduction clearing uses a solution made by adding 1 g of sodium carbonate to each litre of water and then 3 g of sodium dithionite of 85 percent by mass, with thorough stirring, at a liquor ratio of 1 to 40 for 15 min at 60 °C; the dyeings are then washed clean and air dried or ironed flat below 110 °C.

7.6 Shade and strength are assessed according to 7.1 of GB/T 2374-2017.

8 Test report

The test report carries the name of the dye tested; the number of this document; the test method used and the depth of dyeing or printing; the name and model of the instruments and equipment used; the method of assessing the result; the test result; any particular circumstance arising during the test; any departure from this document; and the date of the test.