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Textiles - Quantitative chemical analysis - Mixtures of carbon fibre and certain other fibres

纺织品 定量化学分析 碳纤维与某些其他纤维的混合物

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Textiles - Quantitative chemical analysis - Mixtures of carbon fibre and certain other fibres

Warning: Personnel using this standard shall have practical experience in formal laboratory work. This Standard does not address all possible safety issues. It is the responsibility of the user to take appropriate safety and health measures and to ensure compliance with the conditions which are set by the relevant national regulations.

1 Scope

This Standard specifies the quantitative chemical analysis methods of two-component mixture of carbon fiber and certain other fibers.

This Standard applies to the two-component mixture of carbon fiber and cellulose fiber (cotton, flax, viscose fiber, etc.), protein fiber (mulberry silk, wool, etc.), synthetic fiber (polyamide fiber, polyester fiber, polyacrylonitrile fiber, aramid fiber 1313, aramid fiber 1414).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2910.1, Textiles - Quantitative chemical analysis - Part 1: General principles of testing

3 Sample pretreatment

Put the sample in a Soxhlet extractor; use acetone to extract for 3 hours, with a cycle of at least 6 times per hour. After stopping heating, immediately transfer the sample to hot water not lower than 80 °C and soak it for 3 minutes; stir slightly, at a bath ratio of 50: 1. Then, use hot water and cold water to rinse in turn; dry.

4 Two-component mixture of carbon fiber and cellulose fiber (75% sulfuric acid method)

4.1 Principle

Use 75% (mass fraction) sulfuric acid solution to dissolve the cellulose fiber under specified conditions; collect residues; clean, dry and weigh; Use the modified mass to calculate the percentage of carbon fiber in the dry mass of its mixture, and obtain the percentage of cellulose fiber from the difference value.

4.2 Reagents

Use the reagents specified in GB/T 2910.1 as well as 4.2.1 and 4.2.2 of this Standard.

4.2.1 75% (mass fraction) sulfuric acid solution

Add 1 000 mL of concentrated sulfuric acid (density ρ = 1.84 g/mL at 20 ℃) slowly into 570 mL of water; cool to room temperature. The concentration range of sulfuric acid solution is allowed to be 73% ~ 77% (mass fraction).

4.2.2 Dilute ammonia solution

Take 80 mL concentrated ammonia water (density ρ = 0.880 g/mL); use water to dilute it to 1 L.

4.3 Equipment

Use the equipment specified in GB/T 2910.1 as well as 4.3.1 and 4.3.2 of this Standard.

4.3.1 Erlenmeyer flask with stopper, capacity not less than 500 mL.

4.3.2 Heating equipment, capable of maintaining the temperature at (50 ± 5) ℃.

4.4 Test procedure

Put the prepared samples into an Erlenmeyer flask; add 200 mL of sulfuric acid solution (4.2.1) per gram of samples; cover the flask stopper; shake the flask to fully wet the samples; keep the flask at (50 ± 5) ℃ for 1 h; shake every 10 min. Filter in a glass core crucible of known dry weight to filter; use a small amount of sulfuric acid (4.2.1) to wash the remaining fibers into the glass crucible; vacuum-draw the liquid; then, successively use water to wash, and dilute ammonia water (4.2.2) to neutralize; then, use water to continuously wash the insoluble fibers. Drain the liquid first by gravity and then by suction for each washing.

Finally, dry, cool and weigh the crucible and remaining fibers.

4.5 Calculation and expression of results

The calculation and expression of the results shall be in accordance with GB/T 2910.1. The d value of carbon fiber is 1.00.

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6 Two-component mixture of carbon fiber and polyamide fiber (formic acid method)

6.1 Principle

Use formic acid solution to dissolve the polyamide fiber under specified conditions; collect the residues; clean, dry and weigh; use the modified mass to calculate the percentage of carbon fiber in the dry mass of its mixture, and obtain the percentage of polyamide fiber from the difference value.

6.2 Reagents

Use the reagents specified in GB/T 2910.1 as well as 6.2.1 and 6.2.2 of this Standard.

6.2.1 80% (mass fraction) formic acid solution (ρ = 1.19 g/mL)

Use water to dilute 880 mL of 90% (mass fraction) formic acid (ρ = 1.20 g/mL) to 1 L; alternatively, use water to dilute 780 mL of 98% ~ 100% (mass fraction) formic acid (ρ = 1.22 g/mL) to 1 L.

The concentration of formic acid solution shall be in the range of 77% ~ 83% (mass fraction).

Note: 80% (mass fraction) formic acid solution ρ = 1.186 g/mL.

6.2.2 Dilute ammonia solution

Take 80 mL concentrated ammonia water (ρ = 0.88 g/mL); use water to dilute it to 1 L.

6.3 Apparatuses

Use equipment specified in GB/T 2910.1 as well as the followings:

Erlenmeyer flask with stopper, capacity of 250 mL.

6.4 Test procedure

Put the prepared samples into an Erlenmeyer flask; add 100 mL of formic acid solution (6.2.1) to each gram of samples; cover the flask stopper; shake the flask to fully wet the samples; keep it at room temperature for 15 minutes; shake from time to time. Filter in a glass core crucible of known dry weight; use a small amount of formic acid solution to wash the residue into the glass crucible; vacuum-draw the liquid; then, use formic acid solution (6.2.1) and hot water to wash the residue in turn; then, use dilute ammonia

water (6.2.2) to neutralize it; then, use water to continuously wash the insoluble fibers. Drain the liquid first by gravity and then by suction for each washing.

Finally, dry, cool and weigh the crucible and remaining fibers.

6.5 Calculation and expression of results

The calculation and expression of the results shall be in accordance with GB/T 2910.1. The d value of carbon fiber is 1.00.

7 Two-component mixture of carbon fiber with polyester fiber, polyacrylonitrile fiber and aramid fiber 1313 (concentrated sulfuric acid method)

7.1 Principle

Use concentrated sulfuric acid solution (ρ = 1.84 g/mL) to dissolve polyester fiber, polyacrylonitrile fiber and aramid fiber 1313 under specified conditions; collect the residues; clean, dry and weigh; Use the modified mass to calculate the percentage of carbon fiber in the dry mass of the mixture; obtain the percentage of polyester fiber, polyacrylonitrile fiber and aramid fiber 1313 from the difference value.

7.2 Reagents

Use the reagents specified in GB/T 2910.1 as well as 7.2.1, 7.2.2 and 7.2.3 of this Standard.

7.2.1 Concentrated sulfuric acid (ρ = 1.84 g/mL)

7.2.2 50% (mass fraction) sulfuric acid solution

Add 400 mL of concentrated sulfuric acid (ρ = 1.84 g/mL at 20 °C) slowly into 500 mL of water; cool to room temperature; use water to dilute to 1 L.

7.2.3 Dilute ammonia solution

Add water to dilute 80 mL of concentrated ammonia water (ρ = 0.880 g/mL) to 1 L.

7.3 Apparatuses

Use the equipment specified in GB/T 2910.1 as well as 7.3.1 and 7.3.2 of this Standard.

7.3.1 Beaker, capacity of 250 mL.

7.3.2 Flat-headed glass rod.

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