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Textiles — Quantitative chemical analysis —

Part 27: Mixtures of cellulose fibres with certain other fibres (method using aluminium sulfate)

Textiles — Analyse chimique quantitative —
Partie 27: Mélanges de fibres cellulosiques avec certaines autres fibres (méthode au sulfate d'aluminium)

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Foreword

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This document was prepared by Technical Committee ISO/TC 38, *Textiles*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

A list of all parts in the ISO 1833 series can be found on the ISO website.

Introduction

There are several kinds of test methods to determine the composition of fibre mixtures which include manual separation, chemical and microscopical methods. Chemical methods (selective dissolution method) for the analysis of fibre composition are applicable to most of the textile products. The procedure of such test method is that a component is dissolved out by chemical solvents, and then the insoluble residue is weighed. Caution should be exercised in handling chemical solvents such as sulfuric acid (70 %), hydrochloric acid (20 %) and dimethylformamide, etc. These solvents are hazardous and not easy to handle.

An alternative test method can be an eco-friendly and safer test method due to using non-hazardous chemicals. For the mixture of cellulose fibres and some other fibres, cellulose fibre is degraded through carbonization by a small amount of acid and heat treatment, and the residue remains without damage. Environmental condition and safety in the testing room can be improved by this test method.

Textiles — Quantitative chemical analysis —

Part 27: Mixtures of cellulose fibres with certain other fibres (method using aluminium sulfate)

WARNING — This document calls for the use of substances/procedures that may be injurious to the health/environment if appropriate conditions are not observed. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety/environment at any stage.

1 Scope

This document specifies a method, using aluminium sulfate, to determine the mass percentage of cellulose fibres, after removal of non-fibrous matter, in textiles made of mixtures of

— cellulose fibres (natural or regenerated)

with

— polyester, polyamide, acrylic, wool and elastane fibres.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 1833-1:2006, *Textiles — Quantitative chemical analysis — Part 1: General principles of testing*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

The cellulose fibres are degraded from a known dry mass of the mixture with aluminium sulfate and then heat treatment, but the residue remains without damage. The residue is collected, washed, dried and weighed; its mass is expressed as a percentage of the dry mass of the mixture. The percentage of cellulose fibre is found by difference.

5 Reagent

Use the reagents described in ISO 1833-1 together with the following.

5.1 Aluminium sulfate octadecahydrate, assay: a mass fraction of 51,0 %~57,5 %.

5.2 Glycerol, minimum assay to be >99 %.

5.3 Guar gum, minimum assay to be >99 %.

6 Apparatus

Use the apparatus described in ISO 1833-1 together with those given in 5.1 and 5.2.

6.1 Heating device, consisting of top and bottom heated plate at (160 ± 2) °C and applying a pressure of (40 ± 10) g/cm^2 on the specimen.

6.2 Mechanical shaker, horizontal type, shaking speed of about 250 min^{-1} to 300 min^{-1} and shaking vibration amplitude of at least 25 mm.

6.3 Square shaped plastic bottle, capacity (500 ± 50) ml.

6.4 Non-corrodible (stainless) steel balls, approximately 6 mm in diameter.

6.5 Standard sieve, 120 µm ~ 150 µm aperture size.

6.6 Wringer.

7 Sampling and pre-treatment of sample

7.1 Sampling

Take from the laboratory sample, a test specimen of dimension suitable for the size of the hot plate.

7.2 Pre-treatment of laboratory test sample

Proceed with the pre-treatment as described in ISO 1883-1:2006, 8.2.

8 Preparation of carbonization solution

Prepare a solution containing 200 g of aluminium sulfate (5.1), 300 g of glycerol (5.2) and 1 g of guar gum (5.3), made up to 1 l with water.

9 Test procedure

9.1 General

Follow the general procedure described in ISO 1833-1, and then proceed as follows.

9.2 Soaking the test specimen with carbonization solution

Soak the test specimen in the carbonization solution to ensure complete wetting.

Pass it through the wringer (6.6) until it is completely impregnated by the solution. Then, weigh test specimen and check the mass of wet test specimen is over 1,7 times its dry mass.

It is recommended to squeeze the wet specimen through the wringer for even treatment, but it is possible to squeeze it by hand or other instrument.

9.3 Carbonizing

Place the wet test specimen on the heated bottom plate of heating device (6.1) at 160 °C and press it by the heated upper plate at 160 °C with pressure a of (40 ± 10) g/cm^2 for $5^{+2}_{\circ}$ min.

9.4 Removal of carbonized fibre

Shake the square-shaped bottle (6.3) containing the carbonized test specimen, 40 ml ~ 100 ml water and about 150 stainless steel balls (6.4) using mechanical shaker (6.2) vigorously for about 5 min.

Filter the contents of bottle through the standard sieve (6.5).

Insert 300 ml ~ 500 ml water into the bottle (6.3).

Rinse any remaining fibres in the bottle (6.3) with cold water.

Finally, filter the contents of bottle through the standard sieve (6.5), remove the stainless balls from the sieve (6.5), dry the sieve and residue, and cool and weigh them.

Examine the residue microscopically, or otherwise, as appropriate, to check that the treatment has in fact completely removed the carbonized cellulose fibre.

NOTE There are other methods to remove the carbonized fibre from the specimen, such as shaking the bottle (containing specimen and steel balls) vigorously up and down by hand or spraying water on the specimen with high pressure.

10 Calculation and expression of results

Calculate the results as described in the general instructions of ISO 1833-1.

The value of *d* is 1,00.

11 Precision

On a homogeneous mixture of textile materials, the confidence limits of results obtained by this method are not greater than ±1 percentage point for a confidence level of 95 %.