INTERNATIONAL STANDARD

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Textiles — Quantitative chemical analysis —

Part 1: General principles of testing

Textiles — Analyses chimiques quantitatives —
Partie 1: Principes généraux des essais

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1833-1 was prepared by Technical Committee ISO/TC 38, *Textiles*.

This first edition of ISO 1833-1 cancels and replaces ISO/TR 5090:1977 and partially revises ISO 1833:1977.

ISO 1833:1977 will be cancelled and replaced by ISO 1833-1, ISO 1833-3, ISO 1833-4, ISO 1833-5, ISO 1833-6, ISO 1833-7, ISO 1833-8, ISO 1833-9, ISO 1833-10, ISO 1833-11, ISO 1833-12, ISO 1833-13, ISO 1833-14, ISO 1833-15, ISO 1833-16, ISO 1833-17, ISO 1833-18 and ISO 1833-19.

ISO 1833 consists of the following parts, under the general title *Textiles — Quantitative chemical analysis*:

— *Part 1: General principles of testing*

— *Part 2: Ternary fibre mixtures*

— *Part 3: Mixtures of acetate and certain other fibres (method using acetone)*

— *Part 4: Mixtures of certain protein and certain other fibres (method using hypochlorite)*

— *Part 5: Mixtures of viscose, cupro or modal and cotton fibres (method using sodium zincate)*

— *Part 7: Mixtures of polyamide and certain other fibres (method using formic acid)*

— *Part 8: Mixtures of acetate and triacetate fibres (method using acetone)*

— *Part 9: Mixtures of acetate and triacetate fibres (method using benzyl alcohol)*

— *Part 10: Mixtures of triacetate or polylactide and certain other fibres (method using dichloromethane)*

— *Part 11: Mixtures of cellulose and polyester fibres (method using sulfuric acid)*

— *Part 12: Mixtures of acrylic, certain modacrylics, certain chlorofibres, certain elastanes and certain other fibres (method using dimethylformamide)*

— *Part 13: Mixtures of certain chlorofibres and certain other fibres (method using carbon disulfide/acetone)*

— *Part 14: Mixtures of acetate and certain chlorofibres (method using acetic acid)*

— *Part 15: Mixtures of jute and certain animal fibres (method by determining nitrogen content)*

— *Part 16: Mixtures of polypropylene fibres and certain other fibres (method using xylene)*

— *Part 17: Mixtures of chlorofibres (homopolymers of vinyl chloride) and certain other fibres (method using sulfuric acid)*

— *Part 18: Mixtures of silk and wool or hair (method using sulfuric acid)*

— *Part 19: Mixtures of cellulose fibres and asbestos (method by heating)*

— *Part 21: Mixtures of chlorofibres, certain modacrylics, certain elastanes, acetates, triacetates and certain other fibres (method using cyclohexanone)*

The following parts are under preparation:

— *Part 6: Mixtures of viscose or certain types of cupro or modal or lyocell and cotton fibres (method using formic acid and zinc chloride)*

— *Part 20: Mixtures of elastane and certain other fibres (method using dimethylacetamide)*

— *Part 22: Mixtures of viscose or certain types of cupro or modal or lyocell and flax fibres (method using formic acid and zinc chlorate)*

— *Part 23: Mixtures of polyethylene and polypropylene (method using cyclohexanone)*

— *Part 24: Mixtures of polyester and some other fibres (method using phenol and tetrachloroethane)*

Introduction

In general, the methods described in the different parts of ISO 1833 are based on the selective solution of an individual component. After the removal of a component, the insoluble residue is weighed, and the proportion of soluble component is calculated from the loss in mass. This part of ISO 1833 gives the information which is common to the analyses, by this method, of all fibre mixtures, whatever their composition. This information should be used in conjunction with the other parts of ISO 1833; these parts contain the detailed procedures applicable to particular fibre mixtures. Where, occasionally, an analysis is based on a principle other than selective solution, full details are given in the appropriate part.

Mixtures of fibres during processing and, to a lesser extent, finished textiles may contain fats, waxes or dressings, either occurring naturally or added to facilitate processing. Salts and other water-soluble matter may also be present. Some or all of these substances would be removed during analysis, and calculated as the soluble-fibre component. To avoid this error, non-fibrous matter should be removed before analysis. A method of pre-treatment for removing oils, fats, waxes and water-soluble matter is given in Annex A of this part of ISO 1833.

In addition, textiles may contain resins or other matter added to bond the fibres together or to confer special properties, such as water-repellence or crease-resistance.

Such matter, including dyestuffs in exceptional cases, may interfere with the action of the reagent on the soluble component and/or it may be partially or completely removed by the reagent. This type of added matter may also cause errors and should be removed before the sample is analysed. If it is impossible to remove such added matter, the methods of analysis are no longer applicable. Dye in dyed fibres is considered to be an integral part of the fibre and is not removed.

Most textile fibres contain water, the amount depending on the type of fibre and on the relative humidity of the surrounding air. Analyses are conducted on the basis of dry mass, and a procedure for determining the dry mass of test specimens and residues is given in this part of ISO 1833. The result is therefore obtained on the basis of clean, dry fibres.

Provision is made for recalculating the result on the basis of

a) agreed allowances for moisture content[1)],

b) agreed allowances for moisture and also for

   1) fibrous matter removed in the pre-treatment, and

   2) non-fibrous matter (for example, fibre dressing, processing oil, or size) that can be properly regarded as part of the fibre as an article of commerce.

In some methods, the insoluble component of a mixture may be partially dissolved in the reagent used to dissolve the soluble component. Where possible, reagents have been chosen that have little or no effect on the insoluble fibres. If loss in mass is known to occur during the analysis, the result should be corrected; correction factors for this purpose are given. These correction factors have been determined in several laboratories by treating, in the appropriate reagent as specified in the method of analysis, fibres cleaned by the pre-treatment. These correction factors apply only to undegraded fibres, and different correction factors may be necessary if the fibres have been degraded during processing.

1) The values to use are the conventional conditioning rates for the respective fibres, when rates exist.

The procedures given apply to single determinations; at least two determinations on separate test specimens should be made, but more may be carried out if desired. Before proceeding with any analysis, all the fibres present in the mixture should have been identified. For confirmation, unless it is technically impossible, it is recommended that use be made of alternative procedures whereby the constituent that would be the residue in the standard method is dissolved out first.

If it is practicable to separate the components of a mixture manually, the method described in Annex B should be used in preference to the chemical methods of analysis given in the individual parts of ISO 1833.

Textiles — Quantitative chemical analysis —

Part 1: General principles of testing

1 Scope

This part of ISO 1833 specifies a common method for the quantitative chemical analysis of various binary mixtures of fibres. This method and the methods described in the other parts of ISO 1833 are applicable, in general, to fibres in any textile form. Where certain textile forms are excepted, these are listed in the scope of the appropriate part.

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.

ISO 5089, *Textiles — Preparation of laboratory test samples and test specimens for chemical testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
non-fibrous matter
processing aids such as lubricants and sizes (but excluding jute-batching oils), and naturally occurring non-fibrous substances

4 Principle

After the identification of the components of a mixture, one component is removed, usually by selective solution, the insoluble residue is weighed, and the proportions of soluble component are calculated from the loss in mass. Where relevant, the fibre in the larger proportion is removed first.

5 Reagents

Use only reagents of recognized analytical grade.

5.1 **Light petroleum**, re-distilled, distilling between 40 °C and 60 °C.

5.2 **Distilled or deionized water**.

6 Apparatus

6.1 Glass filter crucible, capacity 30 ml to 40 ml, with sealed-in sintered disk filter with pore size of 90 µm to 150 µm.

The crucible shall be provided with either a ground glass stopper or a watch-glass cover.

NOTE In place of a glass filter crucible, any other apparatus giving identical results may be used.

6.2 Vacuum flask.

6.3 Desiccator containing self-indicating silica gel.

6.4 Ventilated oven for drying specimens at (105 ± 3) °C.

6.5 Analytical balance with a resolution of 0,000 2 g or better.

6.6 Soxhlet extraction apparatus, of sufficient size to give a volume, in millilitres, equal to 20 times the mass, in grams, of the specimen, or any other apparatus giving identical results.

7 Conditioning and testing atmosphere

Because dry masses are determined, it is unnecessary to condition the specimen. The analysis is carried out under ordinary room conditions.

8 Sampling and pre-treatment of sample

8.1 Sampling

Take a laboratory test sample, as described in ISO 5089, that is representative of the laboratory bulk sample and sufficient to provide all the specimens, each of at least 1 g, that are required. Fabrics may contain yarns of different composition and account should be taken of this fact in the sampling of the fabric. Treat the sample as described in 8.2

8.2 Pre-treatment of laboratory test sample

Extract the air-dry sample in a Soxhlet apparatus with light petroleum for 1 h at a minimum rate of six cycles per hour.

Allow the light petroleum to evaporate from the sample. Soak the specimen in cold water for 1 h, and then in water at (65 ± 5) °C for a further 1 h. In both cases, use a liquor/specimen ratio of 100/1 and agitate the liquor from time to time. Remove the excess water from the sample by squeezing, suction, or centrifuging and then allow the sample to become air-dry.

Where non-fibrous matter cannot be extracted with light petroleum and water, it shall be removed by a suitable method that does not substantially alter any of the fibre constituents. However, for some unbleached, natural vegetable fibres (for example, jute, coir), it is to be noted that normal pre-treatment with light petroleum and water does not remove all the natural non-fibrous substances; nevertheless, additional pre-treatment is not applied unless the sample contains finishes which are insoluble in both light petroleum and water.

9 Procedure

9.1 General instructions

9.1.1 Drying

Conduct all drying operations for not less than 4 h and not more than 16 h at (105 ± 3) °C in a ventilated oven with the oven door closed throughout.

NOTE The specimen should be dried until constant mass is achieved.

9.1.2 Drying of specimen

Dry the specimen in a weighing bottle with its stopper beside it. After drying, stopper the weighing bottle before removing it from the oven, and transfer it quickly to a desiccator.

9.1.3 Drying of crucible and residue

Dry the filter crucible with its stopper or cover beside it in the oven. After drying, close the crucible and transfer it quickly to a desiccator.

9.1.4 Cooling

Conduct all cooling operations until complete cooling is attained, and in any case for not less than 2 h with the desiccator beside the balance.

9.1.5 Weighing

After cooling, complete the weighing of the weighing bottle or crucible within 2 min of its removal from the desiccator.

Weigh to an accuracy of 0,000 2 g.

NOTE Do not handle the crucibles, specimens or residues with bare hands during the drying, cooling and weighing operations.

9.2 Testing execution

Take from the pre-treated laboratory test sample a test specimen weighing about 1 g. Cut yarn or dissected cloth into lengths of about 10 mm. Dry the specimen in a weighing bottle, cool it in a desiccator and weigh it.

Transfer the specimen to the glass vessel specified in the appropriate part of ISO 1833, reweigh the weighing bottle immediately, and obtain the dry mass of the specimen by the difference.

Complete the test procedure as specified in the appropriate part of ISO 1833, and examine the residue microscopically, or otherwise, as appropriate, to check that the treatment has in fact completely removed the soluble fibre.