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Textiles — Determination of pH of aqueous extract

Textiles — Détermination du pH de l'extrait aqueux

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 3071:2005), which has been technically revised.

The main change compared to the previous edition is as follows:

— in Clause 7, only two test specimens are specified instead of three;

— in 8.1, water has been omitted as an extracting solution.

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.

Introduction

The pH-value of the aqueous extract of a textile affords a useful index to its processing history. In addition, it is becoming more common to demand that the textile, in its various forms, conforms to certain limits in respect of its acidity or alkalinity, often expressed in terms of the pH-value of the aqueous extract.

Textiles — Determination of pH of aqueous extract

1 Scope

This document specifies a method for determining the pH of the aqueous extract of textiles. The method is applicable to textiles in any form (e.g. fibres, yarns, fabrics).

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 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

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

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/

3.1
pH
co-logarithm of the hydrogen ion concentration in an aqueous extract

4 Principle

The pH-value of an aqueous extract of a textile is measured electrometrically at room temperature by means of a glass electrode.

5 Reagents

All reagents used shall be of recognized analytical grade.

5.1 Distilled or deionized water, of at least grade 3 as defined in ISO 3696, having a pH between 5,0 and 7,5.

The pH shall be verified the first time the water is used. If it is not within the specified range, the water shall be redistilled using chemically resistant glassware. Acid or organic matter can be removed by distilling water from a solution of 1 g/l potassium permanganate and 4 g/l sodium hydroxide. Alkalinity (e.g. the presence of ammonia) can be removed by distilling the water from a solution of dilute sulfuric acid. If the distilled water is not grade 3, boil 100 ml of distilled water in a beaker at a moderate rate for (10 ± 1) min and allow the covered beaker to cool to room temperature.

5.2 Potassium chloride solution, 0,1 mol/l, prepared using distilled or deionized water (5.1).

5.3 Buffer solutions, which may be prepared as specified in Annex A, or obtained commercially, having a pH similar to that being determined, for calibration of the pH-meter before measurement. Buffer solutions having a pH around 4, 7 or 9 are recommended.

6 Apparatus

6.1 Stoppered glass or polypropylene flasks, chemically resistant, for preparation of the aqueous extract.

It is recommended that the glassware used for this test be set aside for this purpose only.

6.2 Mechanical shaker, providing rotational or reciprocating movement sufficient to obtain a ready exchange of liquid between the interior of the textile material and the solution used in preparing the extract. A to-and-fro movement at a rate of 60 r/min or a rotational frequency of 30 r/min has been found satisfactory.

6.3 Beakers, chemically resistant, with a capacity of 150 ml (see 6.1).

6.4 Rods, chemically resistant (see 6.1).

6.5 pH-meter, with a glass electrode, with a resolution of at least 0,01 pH-units.

A pH-meter with temperature compensation is recommended.

6.6 Balance, with a resolution of at least 0,01 g.

6.7 1 l volumetric flasks, of grade A quality.

7 Preparation of test specimens

Take a laboratory test sample representative of the bulk of the textile material and sufficient to provide all the test specimens required. Cut the laboratory test sample into pieces having approximately 5 mm sides or of such a size as to allow the test specimens to wet out rapidly.

To avoid contamination, handle the material as little as possible. Take from the laboratory test sample two test specimens of (2,00 ± 0,05) g each.

8 Procedure

8.1 Preparation of the aqueous extract

Prepare the extract of each test specimen at room temperature as follows.

Place each test specimen and 100 ml of extracting solution [potassium chloride solution (5.2)] into a stoppered flask (6.1). Agitate the flask for a short period by hand to ensure that the textile material is properly wetted out, then shake it mechanically (6.2) for 2 h ± 5 min.

8.2 Measurement of the pH of the aqueous extract

Record the temperature of the extracting solution used.

Calibrate the pH-meter, according to the manufacturer instructions, at the temperature of the extract to be measured. Check the calibration of the pH-meter using two buffer solutions.

Immerse the electrode several times in the KCl solution used to prepare the extract until the indicated pH-value stabilizes.

Decant a portion of the first extract into a beaker, immediately immerse the electrode to a depth of at least 10 mm and stir gently with a rod until the pH-value stabilizes (do not record the pH-value of this solution).

Decant the remaining first into another beaker, immediately immerse the electrode, without washing, in the beaker to a depth of at least 10 mm and allow to stand without stirring until the pH-value stabilizes. Record this value as the first measurement.

Decant the second extract into another beaker, immediately immerse the electrode, without washing, in the beaker to a depth of at least 10 mm and allow to stand without stirring until the pH-value stabilizes. Record this value as the second measurement.

9 Calculation

If the difference between the two pH-values, expressed to the nearest 0,1 pH-units, is greater than 0,2, repeat the procedure with other test specimens. When two valid measurements have been obtained, calculate the mean value.

10 Precision

Interlaboratory trials were carried out between nine laboratories measuring seven samples. Statistical analysis was carried out and the following result was obtained:

Using KCl solution (5.2) as the extracting solution: Reproducibility limit R = 1,1 pH-units.

NOTE The statistical analysis was carried out in accordance with ISO 5725-2.

11 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 3071:2020;

b) the mean pH-value, to the nearest 0,1 pH-units;

c) the pH of the extracting solution;

d) the temperature of the extracting solution;

e) any factor likely to have had an effect on the results, including any resistance to wetting out of the test samples;

f) the date of the test.