
**Textiles — Determination of pH
of aqueous extract**

Textiles — Détermination du pH de l'extrait aqueux



Reference number
ISO 3071:2005(E)

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Foreword

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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 3071 was prepared by Technical Committee ISO/TC 38, *Textiles*.

This third edition cancels and replaces the second edition (ISO 3071:1980), which has been technically revised.

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 International Standard specifies a method for determining the pH of the aqueous extract of textiles. The method is applicable to textiles in any form.

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 3696:1987, *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.

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

NOTE It is recommended that the glassware used for this test be set aside for this purpose only and filled with distilled water between tests.

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 min^{-1} or a rotational frequency of 30 min^{-1} has been found satisfactory.

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

6.4 Rods, chemically resistant (see Note to 6.1).

6.5 pH-meter, with a glass electrode, capable of measuring to at least 0,1 pH-units.

6.6 Balance, accurate to 0,01 g.

6.7 1 l volumetric flasks, of grade A quality.

7 Preparation of test samples

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

7.2 To avoid contamination, handle the material as little as possible. Take from the laboratory sample three test samples of $(2,00 \pm 0,05)$ g each.

8 Procedure

8.1 Preparation of the aqueous extract

Prepare the extract in triplicate at room temperature, as follows:

Place each test sample and 100 ml of extracting solution [either water (5.1) or 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 for $2 \text{ h} \pm 5 \text{ min}$.

Record the temperature of the extracting solution used.

8.2 Measurement of the pH of the aqueous extract

Calibrate the pH-meter 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 same solution (water or KCl solution) used to prepare the extract until the indicated pH-value stabilizes.

Decant 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 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.

Decant the third 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.

Record the pH-values of the second and third extracts as the first and second measurements.

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 samples. 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 results were obtained:

Using water (5.1) as the extracting solution: Reproducibility limit $R = 1,7$ pH-units;

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, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*.

11 Test report

The test report shall include the following information:

- a) a reference to this International Standard, i.e. ISO 3071;
- b) the mean pH-value, to the nearest 0,1 pH-units;
- c) the type of solution used (water or KCl solution);
- d) the pH of the extracting solution;
- e) the temperature of the extracting solution;
- f) any factor likely to have had an effect on the results, including any resistance to wetting out of the test samples
- g) the date of the determination.

Annex A (informative)

Preparation of standard buffer solutions

A.1 General

Use only reagents of recognized analytical reagent grade. Prepare the buffer solutions using water of at least grade 3 as defined in ISO 3696 and renew them at least once a month.

A.2 pH 4,0 potassium hydrogen phthalate solution (0,05 mol/l)

Dissolve 10,21 g of potassium hydrogen phthalate ($\text{KHC}_8\text{H}_4\text{O}_4$) in distilled or deionized water in a 1 l volumetric flask and dilute to the mark. The pH of this solution is 4,00 at 20 °C and 4,01 at 25 °C.

A.3 pH 6,9 potassium dihydrogen orthophosphate and disodium hydrogen orthophosphate solution (0,08 mol/l)

Dissolve 3,9 g of potassium dihydrogen orthophosphate (KH_2PO_4) and 3,54 g of disodium hydrogen orthophosphate (Na_2HPO_4) in distilled or deionized water in a 1 l volumetric flask and dilute to the mark.

The pH of this solution is 6,87 at 20 °C and 6,86 at 25 °C.

A.4 pH 9,2 disodium tetraborate solution (0,01 mol/l)

Dissolve 3,80 g of disodium tetraborate decahydrate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$) in distilled or deionized water in a 1 l volumetric flask and dilute to the mark. The pH of this solution is 9,23 at 20 °C and 9,18 at 25 °C.

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