International Standard 3071

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Textiles — Determination of pH of the aqueous extract

Textiles — Détermination du pH de l'extrait aqueux

Second edition — 1980-10-15

UDC 677.06/.6 : 543.257.1 **Ref. No. ISO 3071-1980 (E)**

Descriptors : textiles, tests, determination of content, pH, aqueous extract, measurement.

Price based on 3 pages

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3071 was developed by Technical Committee ISO/TC 38, *Textiles*, and was circulated to the member bodies in September 1979.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Romania
Belgium	India	South Africa, Rep. of
Bulgaria	Indonesia	Spain
Canada	Israel	Sweden
China	Japan	Switzerland
Cyprus	Korea, Rep. of	Thailand
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Denmark	Netherlands	United Kingdom
Egypt, Arab Rep. of	New Zealand	USA
Finland	Norway	USSR
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Germany, F. R.
Italy

This second edition cancels and replaces the first edition (i.e. ISO 3071-1975).

Textiles — Determination of pH of the aqueous extract

0 Introduction

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

1 Scope and field of application

This International Standard specifies a method for determining the pH value of the aqueous extract of textiles.[1)]

The method is applicable to textile in any form (fibres, yarn, fabrics, etc.), provided that a small representative sample may be obtained which is in, or may be reduced to, a form which permits a ready exchange of liquid between the interior of the material and the water used in preparing the extract.

2 Reference

ISO 139, *Textiles — Standard atmospheres for conditioning and testing.*

3 Principle

Electrometric measurement (pH meter), using a glass electrode of the pH value of the aqueous extract of the textile, at ambient temperature.

4 Reagents

4.1 Distilled or deionized water, having a pH between 5,0 and 6,5. It should have a maximum conductivity of 2×10^{-6} S/cm* at 20 ± 2 °C.

Remove carbon dioxide from the water by boiling for 5 min, then cool in the absence of air before use.

4.2 Buffer solutions, of pH similar to that being determined, for standardization of the pH meter before measurement. For example, the following solutions are recommended.

4.2.1 Primary standard : potassium hydrogen phthalate, $c(HOOC{\cdot}C_6H_4COOK) = 0{,}05$ mol/l [2)], pH 4,000 at 15 °C, 4,001 at 20 °C, 4,005 at 25 °C, 4,011 at 30 °C.

4.2.2 Secondary standard : *di*sodium tetraborate decahydrate, $c(Na_2B_4O_7{\cdot}10H_2O) = 0{,}05$ mol/l [2)], pH 9,33 at 10 °C, 9,23 at 20 °C, 9,18 at 25 °C, 9,14 at 30 °C, and 9,07 at 40 °C.

5 Apparatus

5.1 Glass stoppered flasks, of chemically resistant glass, for preparation of the aqueous extract.

5.2 Mechanical shaker, providing rotational or reciprocating movement sufficient to provide a ready exchange of liquid between the interior of the material and the water 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} have been found satisfactory.

5.3 pH meter, discriminating to at least 0,05 in pH, and **suitable electrode system.**

5.4 Beakers, chemically resistant, of capacity 150 ml.

5.5 Balance, accurate to 0,05 g.

1) The values obtained for the pH of the aqueous extract of samples of textiles by the method specified in this International Standard cannot be used to give a quantitative estimate of the acidity or alkalinity of the textile. Such an interpretation may be misleading, particularly for pH values less than 3 or greater than 11.

* Siemens per centimetre.

2) Previously 0,05 M.

6 Preparation of test samples

Take a laboratory sample representative of the bulk of the material and sufficient to provide all the test samples required. Cut the laboratory sample into pieces with approximately 5 mm sides, or of dimensions such that the test samples will rapidly wet out. To avoid contamination, handle the material as little as possible.

Condition the test samples in accordance with ISO 139.

7 Procedure

7.1 Preparation of the aqueous extract

Prepare the extract in triplicate at the temperature of the laboratory (which shall be recorded) as follows. Place 2 ± 0,05 g of the textile and 100 ml of the distilled or deionized water (4.1) into a glass-stoppered flask (5.1). Agitate the flask for a short period by hand to ensure that the textile is properly wetted out, then shake it mechanically (5.2) for 1 h.

7.2 Measurement of the pH of the aqueous extract

Follow the procedure specified in either 7.2.1 or 7.2.2. If electrode systems other than those specified below are used, take similar precautions. Carry out each test at the same temperature which should be near the ambient temperature, avoiding any increase in temperature greater than 5 °C.

7.2.1 Procedure using a Morton cell type electrode system

Standardize the meter at the temperature of the extract to be measured (see 4.2).

Wash the cell several times with distilled water until the indicated pH no longer changes. This requires a considerable volume of distilled water.

Pour into the cell sufficient of the first extract to cover the bulb of the glass electrode. Re-stopper the flask. Allow the cell to stand for 3 min. Read the pH value. Drain the cell and pour in a new portion of the same extract. Re-stopper the flask. Allow the cell to stand for 1 min and read the pH. Repeat these operations until the indicated pH reaches its extreme steady value. Discard the first extract.

Without washing out the cell, pour in a sufficient quantity of the second extract to cover the bulb of the glass electrode. Read the pH immediately. Drain the cell and introduce a new portion of this extract. Read the pH value again. Repeat these operations until the indicated pH attains its extreme steady value.

Record this value to the nearest 0,1 unit of pH[1]. Discard the second extract.

Then determine the pH of the third extract using the procedure above, without rinsing the cell.

The pH values of the second and third extracts are recorded as duplicate determinations.

7.2.2 Procedure using a dipping electrode system

Standardize the meter at the temperature of the extract to be measured (see 4.2).

Wash the electrodes until the indicated pH value changes by no more than 0,05 in 5 min. If this cannot be realised, replace the glass and/or reference electrode.

Decant the first extract, with the exclusion of the textile material, into a beaker (5.4). Immediately immerse the electrodes to a depth of at least 1 cm and stir very gently with a glass rod until the pH attains its extreme steady value.

Decant the second extract into a beaker. Transfer the electrodes, without washing, into the second beaker, lowering them gently to a depth of at least 1 cm and allow to stand without stirring until the pH attains its extreme steady value. Record this value to the nearest 0,1 unit of pH[1].

Decant the third extract and transfer the electrodes to the third extract, again without washing. Determine the pH value as described above.

The pH values of the second and third extracts are recorded as duplicate determinations.

8 Calculation and expression of results

Give the values obtained for the second and third extracts as "first and second measurements".

Calculate their mean to the nearest 0,05 unit of pH.

1) For an alkaline extract (pH value greater than 7), the highest steady pH indicated is recorded as the pH value of the extract and, for acid extract (pH value less than 7) the lowest steady pH indicated is recorded as the pH value of the extract. This is referred to as the "extreme steady value".

9 Index of difference

If the value of the pH measured is less than 3 or greater than 9 determine the index of difference as follows :

a) Introduce 10 ml of the prepared aqueous extract into a beaker (5.4) and add 90 ml distilled or deionized water (4.1).

b) Measure the pH of this solution to 0,1 unit of pH, following the procedure specified in 7.2.1 or 7.2.2.

c) The difference between the pH of the aqueous extract prepared as in 7.1 and that of the dilution to 1/10 is the index of difference.

This index of difference, which should never be greater than unity, is especially high when the textile contains strong acids or strong bases and these are not buffered by weak acids or weak bases.

10 Test report

The test report shall include the following information :

a) reference to this International Standard;

b) type of electrodes used;

c) the pH of the distilled water used;

d) the temperature of the laboratory;

e) the results obtained, expressed in the form indicated in clause 8;

f) if necessary, the index of difference (see clause 9);

g) any factors likely to have had an effect on the results, including any resistance to wetting out of the specimen.

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