IS 1560 (Part 2) : 2024

Doc No. : TXD 05 (23594)

***भारतीय मानक***

वस्त्रादि — *सेल्यूलोसिक वस्त्र सामग्री में कार्बोक्जिलिक एसिड समूहों के मूल्यांकन के लिए पद्धति*

*भाग 2 सोडियम क्लोराइड-सोडियम बाइकार्बोनेट पद्धति*

(पहला पुनरीक्षण)

*Indian Standard*

Textiles — Method for Estimation of Carboxylic Acid Groups in Cellulosic Textile, Materials

Part 2 Sodium Chloride-Sodium Bicarbonate Method

(*First Revision*)

ICS 59.060.10

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**B U R E A U OF I N D I A N S T A N D A R D S**

**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**

**N E W D E L H I 110 002**

**April 2024 Price Group**

Chemical Methods of Test Sectional Committee, TXD 05

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1974.The first revision has been made in the light of experience gained since its last publication and to incorporate the following changes:

1. Apparatus and reagents have been updated; and
2. References to Indian standard have been updated.

This standard has been published in two parts. The other part in this series is:

Part 1 Lodometeric Method

In the cellulosic textile industry, cellulose in the form of fibres, yarn and fabric comes in contact with different oxidizing agents during the various chemical processing treatments. The action of these oxidizing agents on cellulose may result in the formation of oxycelluloses of acidic character attributable to the introduction of carboxyl groups into the cellulose chain molecule. Purified cotton cellulose, not subjected to any treatment with oxidizing agents, also behaves as though it possesses a very small content of carboxylic acid groups. The absorption of metallic ions from aqueous solutions of their salts is an outstanding property of oxycelluloses. This property in celluloses and oxycelluloses is due to the presence of carboxylic acid groups in them. The estimation of carboxylic acid groups present in cellulosic textile materials is a method of determining the extent of this type of oxidation of cellulose. This is a useful supplementary test to other tests such as copper number and fluidity tests.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*).

*Indian Standard*

TEXTILES — METHOD FOR ESTIMATION OF CARBOXYLIC ACID GROUPS IN CELLULOSIC TEXTILE, MATERIALS PART 2 SODIUM CHLORIDE — SODIUM BICARBONATE METHOD

*( First Revision )*

**1 SCOPE**

This standard (Part 2) prescribes the sodium chloride-sodium bicarbonate method for estimation of carboxyl acid group content of cellulosic textile materials.

**2 REFERENCE**

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

|  |  |
| --- | --- |
| *IS No.* | *Title* |
|  | —  |
| IS 1070 : 2023 | Reagent Grade Water **—** Specification (*fourth revision*) |
|  |  |

**3 PRINCIPLE**

Sample is de-ashed with hydrochloric acid, washed, soaked in sodium chloride-sodium bicarbonate solution and then filtered off. An aliquot of the filtrate is titrated with 0.01 N hydrochloric acid to a methyl red end point. The amount of the sodium chloride-sodium bicarbonate solution consumed is a measure of the ion-exchange capacity of the cellulose and indicates the extent of carboxyl content.

**4 SAMPLING**

**4.1** Sample shall be so drawn as to be representative of the lot.

**4.2** Sample drawn in accordance with the procedure laid down in the relevant material specification or in compliance with an agreement between the buyer and the seller shall be held to be representative of the lot.

**5 PREPARATION OF TEST SPECIMENS**

Condition the sample under test in the prevailing atmosphere for at least 20 min and cut it into small pieces. Mix all the pieces thoroughly and draw at least 2 test specimens, each weighing about 2.5 g. At the same time draw specimens for moisture content determination.

**6 APPARATUS**

**6.1 Fritted Glass Funnels**

**6.2 Erlenmeyer Flasks** — of Pyrex glass (or similar heat-resistant glass), fitted with a glass stopper and of 250 ml capacity.

**6.3 Stopwatch**

**6.4 Weighing Machine**

**6.5 Graduate Cylinder**

**7 REAGENTS**

**7.1 Quality of Reagents** — Unless specified otherwise, pure chemicals shall be employed in the test and distilled water (*see* IS 1070) shall be used where the use of water as reagent is intended.

NOTE — ‘Pure chemicals’ shall mean chemicals that do not contain impurities which affect the test results.

**7.2** The reagents required for the test shall be as given below.

**7.2.1** *Hydrochloric Acid* — 0.01 N

**7.2.2** *Hydrochloric Acid* — 1 : 99. Dilute 1 volume of concentrated hydrochloric acid (sp gr l.19) with 99 volumes of water.

**7.2.3** *Methyl Red Indicator Solution*

**7.2.4** *Sodium Chloride* — *Sodium bicarbonate solution* dissolve 5.85 g of sodium chloride and 0.84 g of sodium bicarbonate in water and dilute to 1 litre.

**7.2.5** *Sodium Hydroxide Solution* — 0.4 g/l

**7.2.6** *Water Saturated with Carbon Dioxide*

**8 PROCEDURE**

**8.1** Weigh one test specimen accurately, disintegrate it in water and filter through a fritted glass funnel. Disperse the disintegrated specimen to about 1 percent consistency in hydrochloric acid (1: 99) at room temperature. After 2 h collect the specimen on a fritted glass funnel and wash with water saturated with carbon dioxide. Continue washing until the filtrate, after boiling does not require more than two drops of sodium hydroxide solution to give an alkaline colour (yellow) with methyl red.

**8.2** Weigh the wet pulp pad, transfer it to an Erlenmeyer flask, add 50 ml of the sodium chloride- sodium bicarbonate solution with a pipette and shake to obtain a homogeneous slurry (*see* Note). Allow the mixture to stand for 1 hour at room temperature. Filter through a clean, dry fritted glass funnel. Pipette 25 ml aliquot of the filtrate into an Erlenmeyer flask and titrate with 0.01 N hydrochloric acid using methyl red indicator. When the first change in colour occurs, boil the solution for about 1 min to expel carbon dioxide and continue the titration to a sharp end point.

NOTE — If the cation exchange capacity is very low, use a solution containing about 5.85 g of sodium chloride and 0.42 g of sodium bicarbonate per litre. It is important that the excess of sodium bicarbonate should be large enough so that the pH does not fall below 7.0.

**8.3 Blank**

Pipette 25 ml of sodium chloride-sodium bicarbonate solution into an Erlenmeyer flask and titrate as in **8.2**.

**8.4** Determine the moisture content of the sample using the specimens taken for the purpose (*see* **5**) as given in IS 199 and calculate the oven dry mass of the specimen taken for the test (*see* **8.1**).

**8.5** Similarly test other test specimen(s).

**9 CALCULATION**

**9.1** Calculate the carboxylic acid group content of each specimen, in milli-equivalents of COOH per 100 g of the specimen, by the following formula:

Carboxylic acid group content, as

Milli — equivalents of COOH per 100 g

of specimen =

$$\left(V\_{1}- V\_{2}- \frac{V\_{2}m}{50}\right)\frac{2}{M}$$

where

*V*1 = quantity in millilitres of 0.01/N hydrochloric acid consumed in the blank (*see* **8.3**);

*V*2 = quantity in millilitres of 0.01 N hydrochloric acid consumed in the actual test (*see* **8.2**);

*m* = mass in grams of water in the wet pulp pad; and

*M* = oven-dry mass in grams of test specimen (*see* **8.4**).

**9.2** Calculate the average of the values obtained as in **9.1**.

**10 REPORT**

The report shall include the following:

1. Carboxylic acid group content; and
2. Number of specimens tested.

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**ANNEX A**

(*Foreword*)

**COMMITTEE COMPOSITION**

Chemical Methods of Test Sectional Committee, TXD 05

|  *Organization* | *Representative* |
| --- | --- |
| The Synthetics & Art Silk Mills Research Association, Mumbai | Dr Manisha Mathur **(*Chairperson*)** |
| Agilent Technology India Pvt Ltd, New Delhi | Shri Praveen Arya  Dr Manoj Surwade (*Alternate*) |
| Ahmedabad Textile Industry’s Research Association, Ahmedabad  | Shrimati Deepali Plawat Shrimati Fahimunnisa Khatib (*Alternate*) |
| Bidhata Industries Pvt Ltd, Mumbai | Shri Rohit Pacheriwala  Shri R. K. Pacheriwala (*Alternate*) |
| Central Coir Research Institute, Kochi | Director, Rdte Senior Scientific Officer (Polymer) (*Alternate*) |
| Central Institute for Research on Cotton Technology, Mumbai | Dr Sujata Saxena Dr A. S. M. Raja (*Alternate*) |
| Central Silk Technological Research Institute (CSTRI), Bengaluru | Dr Nivedita S. Shrimati Brojeshwari Das (*Alternate*) |
| Directorate General of Quality Assurance (CQAT & C), Kanpur | Col D. B. Kushwaha  Shri Purushottam De (*Alternate*) |
| EMC Testing & Compliance LLP, Gurgaon | Shri Vivek Sharma Shri Satya Ranjan Biswal (*Alternate*) |
| Global Organic Textile Standard, Thane | Shri Rahul Bhajekar Shrimati Prachi Gupta (*Alternate*) |
| Indian Jute Industries Research Association, Kolkata | Ms Ishpita Roy |
| Manjushree Spntek Pvt Ltd, Bangaluru | Shri Madhan R. |
| Northern India Textiles Research Association, Ghaziabad | Dr M. S. Parmar |
| Office of the Textile Commissioner, Mumbai | Shri Gaurav Gupta  Shri Rajesh Mahajan (*Alternate*) |
| Raymonds Ltd, Mumbai | Shri Prabhat Parasher  Shri Saurav Shekhar (*Alternate*) |
| Reliance Industries Ltd, New Delhi | Shri M. S. Verma Shri Mahesh C. Sharma (*Alternate*) |
| SGS, Mumbai | Dr Karthikeyan K.  Shrimati Mahalakshmi R. (*Alternate*) |
| Sunil Industries, Mumbai | Shri Pradeep Roongta  Shri Ramesh Khanna (*Alternate*) |
| Testex India Laboratories Pvt Ltd, Mumbai | Shrimati Meeta Shingala  Shri Mahesh Sharma (*Alternate*) |
| Texanlab Laboratoires Pvt Ltd, Navi Mumbai | Shri Milind R. Marathe  Shri Vivek Patil (*Alternate*) |
| Textile Committee, Mumbai | Shri Kartikeyan Dhanda Dr P. Ravichandran (*Alternate*) |
| The Bombay Textile Research Association, Mumbai | Shri M. P. Satyanarayan Shrimati Saroj Vairagi (*Alternate*) |
| The South India Textile Research Association, Coimbatore | Dr Prakash Vasudevan Shri S. Sivakumar (*Alternate*) |
| The Synthetics & Art Silk Mills Research Association, Mumbai | Shrimati Ashwini A. Sudam Shrimati Leena Mhatre (*Alternate*) |
| U P Textile Technology Institute, Kanpur | Dr Arun Kumar Patra Dr Subhankar Maity (*Alternate*) |
| Wool Research Association, Thane | Dr Mirnal Choudhari Dr Swati Mahadik (*Alternate*) |
| BIS Directorate General | Shri J. K. Gupta, Scientist ‘E’/Director and Head (Textiles) [Representing Director General (*Ex-officio*)] |

*Member Secretary*

Shri Dharmbeer

Scientist ‘D’/Joint Director

 (Textiles), BIS