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Textiles — Determination of index ingredient from coloured textile —

Part 4: Catechu

Textiles — Détermination d'indicateurs d'ingrédients de textiles colorés —

Partie 4: Cachou

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
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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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*.

A list of all parts in the ISO 22195 series can be found on the ISO website.

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

There is no doubt that dyeing plays the most important role in expressing the colour of clothes. Until the invention of synthetic dyes capable of expressing diverse colours today, humankind used materials obtained from nature to dye fabric. Typically, colourants were obtained from plants or various materials were extracted from minerals or insects. Dyeing fabrics using materials derived from these natural substances made it necessary to identify which substances the colourant was derived from. In other words, there has been a demand to confirm whether a fabric has been dyed with a natural substance.

There are several natural dyes raw material which give similar colour tone, they have different colouring molecule and the precise colorant. But each has different environmental profile which decided Environment impact of dyestuff. Textile dyed with natural dyes is claimed for environmental benefit mainly. Identification of dye helps in knowing and verifying the claims, that will help environment to get benefit exactly in the way it is claimed with textile.

This leads to the development of a test method to determine the type of natural substances used.

Textiles — Determination of index ingredient from coloured textile —

Part 4: Catechu

1 Scope

This document specifies a test method which identifies the index ingredient chemical included in coloured fabric with catechu. Catechu can be applied to both natural fibre and man-made fibre.

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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
catechu
deciduous tree common throughout Central and Eastern Africa and Southern Asia, used for fuel, fodder and of course as a source of dye in the form of katha paste

Note 1 to entry: The common name of catechu is plant acacia catechu. It is also commonly known as black catechu. Acacia catechu extract is derived from heartwood of the tree. The by-product of catechu industry which is resonance of cutch. It contains catechin and is used for dyeing textile in brown colour.

3.2
coloured
expressing of colours to textiles by dyeing, printing or coating

3.3
natural colourant
materials obtained from plants, wood, rocks, soil, insects or any other thing existing on earth without any chemical reaction adopted before colouring of textiles

4 Principle

The identification of natural colorant is very important in the scientific examination of the colouring sources of textiles, coloured print, paintings, illuminated manuscripts and other works where natural colorants are used. Natural colourants are usually composed of several phyto chemicals. Each colourant

has a distinctive chemical constituent which acts as a chromophore and imparts specific colour. Colorants from natural sources can be identified by chemical structure of chromophoric chemical. This chromophoric chemical can be extracted from the dyed textile and identified by chromatography.

NOTE On the other hand, if the index component catechin is detected through this test method, it cannot be said that it is necessarily stained with catechu alone. However, based on this principle, applying this test method to unknown coloured fabrics or textiles is useful to provide a minimum amount of information that can be used to confirm whether the fabric is coloured using catechu dye.

5 Reagents

Unless otherwise specified, use only reagents of recognized analytical grade.

5.1 Water, distilled water or grade 3 water in accordance with ISO 3696.

5.2 Acetonitrile, HPLC Grade.

5.3 Catechin, with a mass fraction of 99 %.

5.4 Dimethylformamide (DMF), analytical grade.

5.5 Trifluoroacetic acid, HPLC Grade.

6 Apparatus

6.1 Analytical balance, resolution at 0,001 g.

6.2 Ultrasonic water bath, to be set up at (30 ± 2) °C.

6.3 Silica borate glass container, with a nominal volume of 50 ml.

6.4 Membrane filter, with 0,45 µm pore size.

6.5 Pipette, with a nominal volume of 20 ml.

6.6 Disposable syringe, with a nominal volume of 2 ml.

6.7 High performance liquid chromatograph (HPLC) with photo diode array (PDA) detector.

7 Procedure

7.1 Standard preparation

Catechin (5.3) is prepared in acetonitrile (5.2) containing 1 000 mg/l.

7.2 Preparation of specimen

Cut the sample into pieces of approximately (5 mm × 5 mm). Prepared approximately 2 g of the cut sample, weigh it to nearest 0,01 g, and then place it into the glass container (6.3).

Pipette (6.5) 20 ml of DMF (5.4) each into the other glass container (6.3) and it poured to cut sample containing glass container. Place the sample contained glass container into an ultrasonic bath (6.2) at (30 ± 2) °C for (20 ± 1) min. Afterwards, let the extract cool down to room temperature.

Filter about 1 ml of the extracted solution into a HPLC vial using disposable syringe (6.6) equipped with a membrane filter (6.4).

7.3 Analysis

The detection and qualification of catechin is conducted using HPLC with PDA detector (6.7). The recommendable chromatographic conditions are given in Annex A. Confirm that the retention time and the maximum absorption wavelength of the catechin standard match, or the spectrum matches.

7.4 Qualification of catechin

Comparison between analyses of standard and sample through 7.3 can show the result of existence of catechin in sample.

NOTE Detection of catechin can vary due to conditions of coloured sample. In this case, amount of specimen and extraction solution can be modified and concentration of extracted solution can be adopted.

8 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 22195-4:2021;

b) identification of the sample;

c) quantitative results of catechin;

d) conditions of chromatographic analysis;

e) any deviation from the specified procedure in this document;

f) the date of the test.

Annex A
(informative)

Example of test result

A.1 Analysis of catechu colourant

Prepare 1 ml of catechu colorants solution with 1 mg/ml according to 7.1 by disposable syringe (6.6). The result of chromatogram is shown Figure A.1.

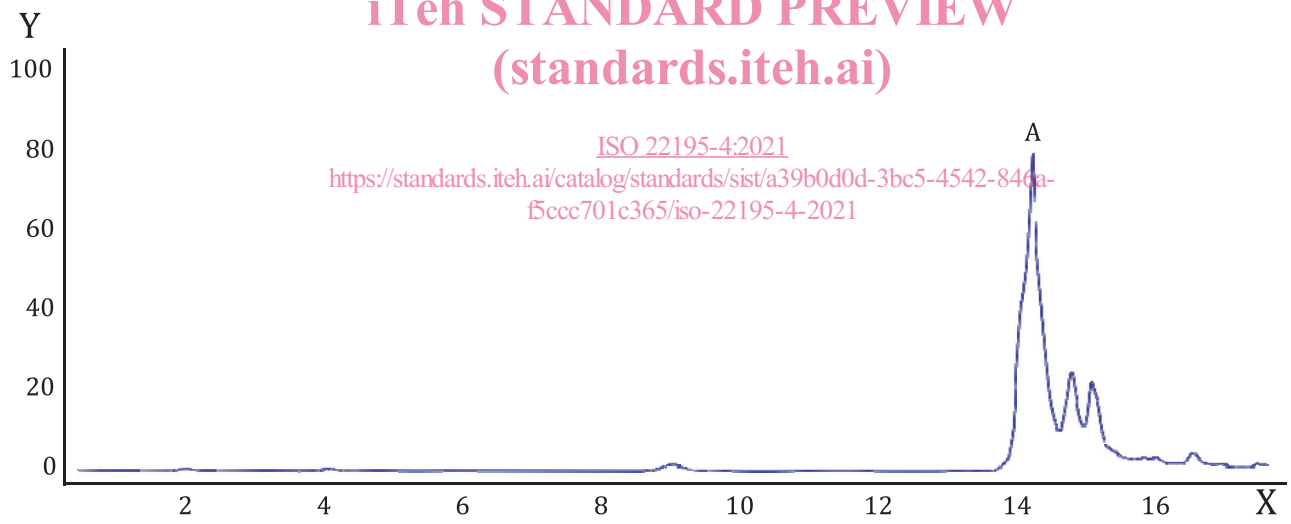
A.1.1 Chromatographic conditions for the HPLC-PDA

The HPLC-PDA analysis is adopted to find out the specified wavelength in 300 nm and its chromatographic conditions are as follows:

— Detection wavelength: 300 nm

— Column: (C-18) 250 mm, 4,6 mm, 5 µm

— Mobile Phase: (a) Trifluoroacetic acid (5.5) (0,2 %) with water and (b) acetonitrile (5.2) (30:70)



Key

X retention time (min)

Y absorbance (mAU)

A peak of Catechin (at 14,463)

Figure A.1 — Chromatogram of catechu colourant by HPLC-PDA

A.2 Analysis of coloured fabric with catechu colourant

A.2.1 Chromatographic conditions for the HPLC

As the instrumental equipment of the laboratories may vary, no generally applicable parameters can be provided for chromatographic analyses.

— Mobile phase: (a) Trifluoroacetic acid (5.5) (0,2 %) with water and (b) acetonitrile (5.2) (30:70)