

**Textiles — Cotton-fibre stickiness —
Detection of sugar by colour reaction**

KS ISO 12027: 2012

TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee

Kenya Industrial Research and Development Institute (KIRDI)
Spinners and Spinners
Bedi Investment
Egerton University
RIVATEX
International Centre for Insect Physiology and Ecology
Cotton Development Authority
Kenya Agricultural Research Institute
Kenya Farmers Association
Kenya Sisal Board
Blanket Industries
Ministry of Industrialization and Enterprises
Makueni Ginnery
Kenya Bureau of Standards — Secretariat

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

© Kenya Bureau of Standards, 2014

Copyright. Users are reminded that by virtue of Section 25 of the Copyright Act, Cap. 12 of 2001 of the Laws of Kenya, copyright subsists in all Kenya Standards and except as provided under Section 26 of this Act, no Kenya Standard produced by Kenya Bureau of Standards may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from the Managing Director.

Textiles — Cotton-fibre stickiness — Detection of sugar by colour reaction

KENYA BUREAU OF STANDARDS (KEBS)

Head Office: P.O. Box 54974, Nairobi-00200, Tel.: (+254 020) 605490, 602350, Fax: (+254 020) 604031
E-Mail: info@kebs.org, Web: <http://www.kebs.org>

Coast Region

P.O. Box 99376, Mombasa-80100
Tel.: (+254 041) 229563, 230939/40
Fax: (+254 041) 229448

Lake Region

P.O. Box 2949, Kisumu-40100
Tel.: (+254 057) 23549, 22396
Fax: (+254 057) 21814

Rift Valley Region

P.O. Box 2138, Nakuru-20100
Tel.: (+254 051) 210553, 210555

KS ISO 12027: 2012

NATIONAL FOREWORD

This Kenya Standard was prepared by the Technical Committee on Blankets, Non wovens, Yarns and Fibres under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

This standard is identical with and has been reproduced from ISO 12027, Textiles — Cotton-fibre stickiness — Detection of sugar by colour reaction, published by the International Organization for Standardization (ISO). The National Standards Council has endorsed the adoption of the 2012 edition of this standard as a Kenya Standard.

For the purposes of this standard, the ISO text should be modified as follows:

a) Terminology

The words 'this Kenya Standard' should replace the words 'this International Standard', whenever they appear.

b) References

The references to International Standards should be replaced by references to the appropriate Kenya Standards, where they have been declared.

**Textiles — Cotton-fibre stickiness —
Detection of sugar by colour reaction**

*Textiles — Collage des fibres de coton — Détection de sucre par
réaction colorée*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Terms and definitions	1
3 Principle	1
4 Reagents	1
5 Apparatus	2
6 Preparation	2
6.1 Sampling and preparation of test specimen	2
6.2 Colour-reaction solution	3
6.3 Colour-reaction paper	3
7 Procedure	3
7.1 Colour-reaction device set-up	3
7.2 Transferring honeydew droplets to colour-reaction paper	3
7.3 Colour-reaction phase	3
8 Assessment of cotton-fibre stickiness	4
8.1 General	4
8.2 Visual assessment	4
8.3 Evaluation using image analysis device	4
9 Results	4
10 Test report	4
Bibliography	8

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 12027 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 23, *Fibres and yarns*.

Introduction

Honeydew on the surface of cotton fibre can be transferred to a metallic surface of the spinning machines or rubber rollers, etc., resulting in lapping. As a result, it may lower the efficiency of the yarn production and yarn quality. Cotton stickiness is due mainly to entomological sugars produced by insects, which are designated by the term “honeydew”. This test method is used to evaluate the degree of honeydew contamination by visualization of honeydew droplets in cotton fibre.

Textiles — Cotton-fibre stickiness — Detection of sugar by colour reaction

1 Scope

This International Standard describes a method for evaluating the degree of cotton-fibre stickiness arising from honeydew contamination through detection of sugar by the colour reaction of a specific treated paper.

2 Terms and definitions

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

2.1

colour-reaction solution

solution consisting of *p*-aminobenzoic acid, acetone, phosphoric acid and water

2.2

colour-reaction paper

filter paper containing colour-reaction solution prepared before the testing

2.3

brown colour spots

spots on the tested colour-reaction paper which are developed by reacting honeydew sugars with *p*-aminobenzoic acid placed in a convection oven

2.4

stickiness grade

grade which indicates the incidence of cotton-fibre stickiness

3 Principle

Honeydew droplets that may occur in a specific cotton web with its fixed surface area and mass are transferred to a colour-reaction paper after a press and incubator lap. The resultant paper image may be evaluated by comparing the appearance of the developed brown spots (honeydew reaction) with a series of five visual standards from which a visual grade is assigned, or the resultant paper image of the brown spots may be scanned into an electronic file for image profile analysis.

4 Reagents

Use only reagents of recognized analytical grade.

4.1 *p*-Aminobenzoic acid.

4.2 Acetone (minimum assay to be > 99 %).

4.3 Phosphoric acid (minimum assay to be > 85 %).

4.4 Water, distilled.

5 Apparatus

5.1 Mechanical opening device, comprising a rotating opening roller covered with metallic card wire suitable for processing cotton fibres into the homogeneous web.

EXAMPLE Fibre cleaner, miniature carding machine or other.

5.2 Analytical balance, weighing to an accuracy of 0,01 g.

5.3 Glass plates or polished stainless plates, at least 100 mm × 100 mm 0/+5 mm.

NOTE Each test sample (there are three per sample) requires two plates. A minimum of six glass plates per sample is required.

5.4 Stopwatch.

5.5 Pressing system, applying a mass of 4 kg on a 100 mm × 100 mm area for 1 min.

5.6 Filter paper: cellulose-containing paper (pore size 5 µm) cut into 100 mm × 100 mm pieces.

5.7 Colour-reaction device, convection oven or similar device which is uniformly heated and maintained at $(120 \pm 0,5)$ °C for 5 min at least.

NOTE the air velocity in the oven is about 1 m/s to 2 m/s.

5.8 Cotton-fibre stickiness replicas¹⁾, the different stickiness replicas are given through five coloured or grey-level images (Figures 1 and 2).

In general, the cotton stickiness grade is assigned by comparing with the grey replicas (Figure 1). It is recommended that coloured replicas (Figure 2) be used as a reference for more precise evaluation.

5.9 Image analysis device, comprising image input apparatus like a scanner and image analysis program. All kinds of the commercial scanners can be used, but the resolution of 200 dpi (0,1 mm/pixel) at least is necessary for this test. The image analysis program may be available from KOTITI (Gyeonggi-do, Korea) or may be programmed for oneself.

6 Preparation

6.1 Sampling and preparation of test specimen

6.1.1 Take at random three laboratory samples from a cotton bale, each weighing $(5 \pm 0,1)$ g.

6.1.2 Remove impurities and prepare three webs, each of mass (5 ± 1) mg/cm², by means of the mechanical opening device (5.1).

6.1.3 Cut one test specimen of 100 mm × 100 mm from each web.

NOTE Card matt, lap, or sliver can also be used as a sample.

1) Cotton-fibre stickiness replicas are available from KOTITI (Korea Textile Inspection & Testing Institute), 138-7 Sangdaewon-dong, Jungwon-gu, Seongnam-si, Gyeonggi-do. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

6.2 Colour-reaction solution

6.2.1 Dissolve $(10 \pm 0,01)$ g of *p*-aminobenzoic acid (4.1) in $(300 \pm 1,0)$ ml of acetone (4.2) thoroughly in a 1 000 ml volumetric flask.

6.2.2 Add $(10 \pm 0,01)$ ml of phosphoric acid (4.3) to the volumetric flask. Fill the volumetric flask with distilled water (4.4) to the 1 000 ml mark and mix to be sure that all chemicals are thoroughly dissolved.

It is preferable to test immediately after preparing the colour-reaction solution because acetone is volatile. Also, it is recommended that the colour-reaction solution be kept in a bottle under refrigerating conditions. Take into account security precautions to manipulate the solution.

6.3 Colour-reaction paper

6.3.1 Prepare a sheet of filter paper (5.6) by cutting a (100×100) mm square for each test specimen.

6.3.2 Wet the filter paper with colour-reaction solution (6.2) and squeeze to remove excess solution by using an instrument such as a wringer [pick-up: (70 ± 5) %].

It is recommended that the colour-reaction paper be sealed off and kept under refrigerated conditions. Do not use colour-reaction paper more than 30 days after its production.

7 Procedure

7.1 Colour-reaction device set-up

Set the colour-reaction device (5.7) in order to obtain a temperature at $(120 \pm 0,5)$ °C across its entire space.

7.2 Transferring honeydew droplets to colour-reaction paper

7.2.1 Place a sheet of colour-reaction paper (6.3) on the glass or polished stainless plate (5.3).

7.2.2 Spread a test specimen (6.1) evenly over the colour-reaction paper and cover it with another glass plate or polished stainless plate.

7.2.3 Load a weight (see 5.5) on the plate for 1 min, timed using a stopwatch (5.4).

7.2.4 Remove the weight, plate and specimen on the colour-reaction paper.

7.3 Colour-reaction phase

Place the colour-reaction paper used in 7.2 in the colour-reaction device and maintain it at $(120 \pm 0,5)$ °C for 5 min, then take it out of the colour-reaction device. The tested colour-reaction paper doesn't need cooling down or conditioning before the assessment is carried out. It is recommended that the assessment be carried out within 10 min of finishing the test, because the colour of the tested paper becomes darker over time.

NOTE The colour shade of tested colour-reaction paper may change according to the performance of the colour-reaction device. When the image of the tested colour-reaction paper is significantly blurred or dark in comparison with the colour replicas (see Figure 2), it is recommended to control the reaction temperature and time.

8 Assessment of cotton-fibre stickiness

8.1 General

Evaluate the cotton-fibre stickiness either visually, using the cotton-fibre stickiness replicas (5.8), or instrumentally, using an image analysis device.

8.2 Visual assessment

8.2.1 Compare the tested colour-reaction paper with the reference image replica (see Figures 1 and 2) and assign a grade of replica that most closely matches the appearance of the reaction paper.

8.2.2 Grade each specimen in accordance with the grading scheme given in Table 1. If the grading appears between two grades, mark a “+” sign on the top right of the lower grade (e.g. C+).

8.2.3 Due to the subjective nature of the assessment, it is recommended that more than one observer carry out the assessment.

Table 1 — Visual assessment

Grade	Description
A	Non-stickiness
B	Light stickiness
C	Moderate stickiness
D	Severe stickiness
E	Very severe stickiness
NOTE Confine observations to the colour spot itself developed on the tested colour-reaction paper.	

8.3 Evaluation using image analysis device

8.3.1 Scan the tested colour-reaction paper with a resolution of at least 200 dpi using image input apparatus like a scanner (see 5.9).

8.3.2 Load the scanned colour image file in the image analysis program.

8.3.3 Determine the stickiness grade using the image analysis program to evaluate the number and area of coloured spots on the scanned image.

9 Results





Record the grading for each specimen and select the lowest grade among the three test results determined in 8.2. The variation in the result should be no more than half a grade. If this variation is more than half a grade, the grading of each specimen shall be reported.

10 Test report

The test result shall include the following information:

- a) a reference to this International Standard;
- b) a description of the laboratory sample;

- c) number of test specimens and number of observers;
- d) date of test;
- e) the individual and final grade assessed;
- f) whether the result is based on:
 - 1) visual assessment,
 - 2) instrumental assessment;
- g) the test conditions, such as pressure, colour-reaction temperature and time;
- h) details of any deviations from the test method.

	
Grade A	Grade B
	
Grade C	Grade D

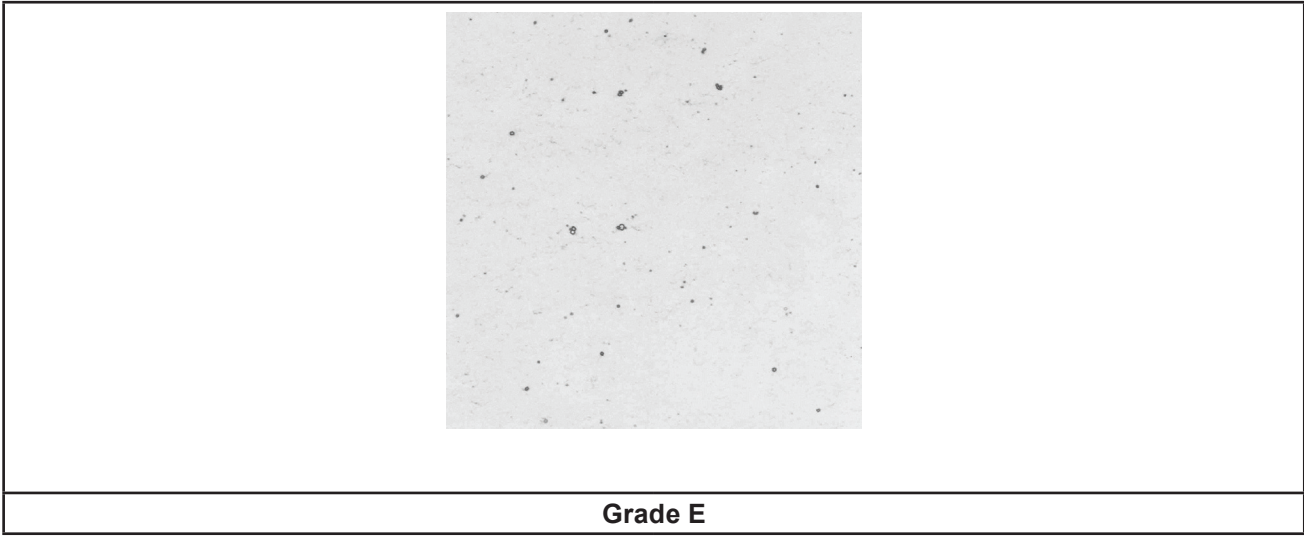
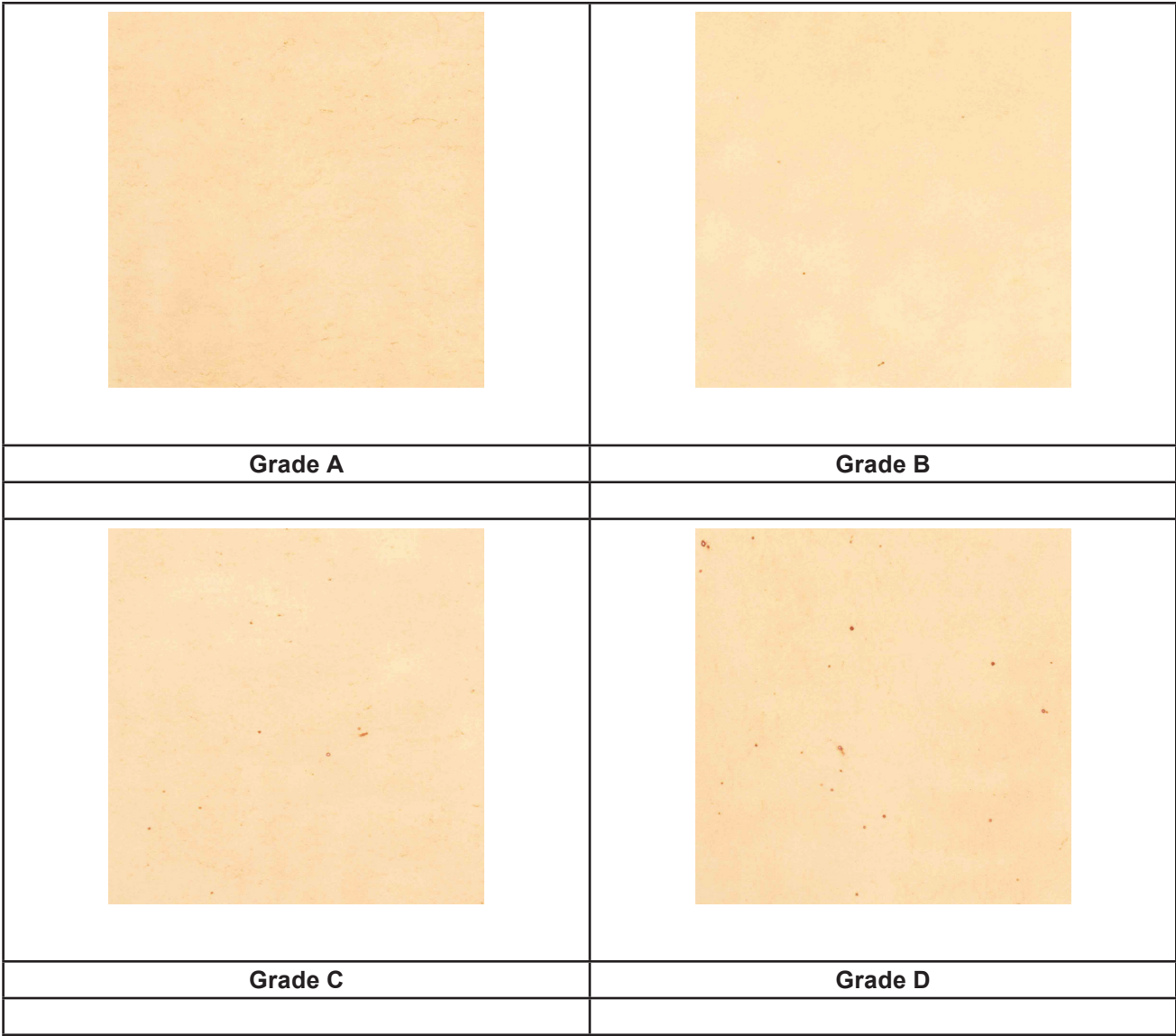


Figure 1 — Cotton-fibre stickiness replicas (grey image)



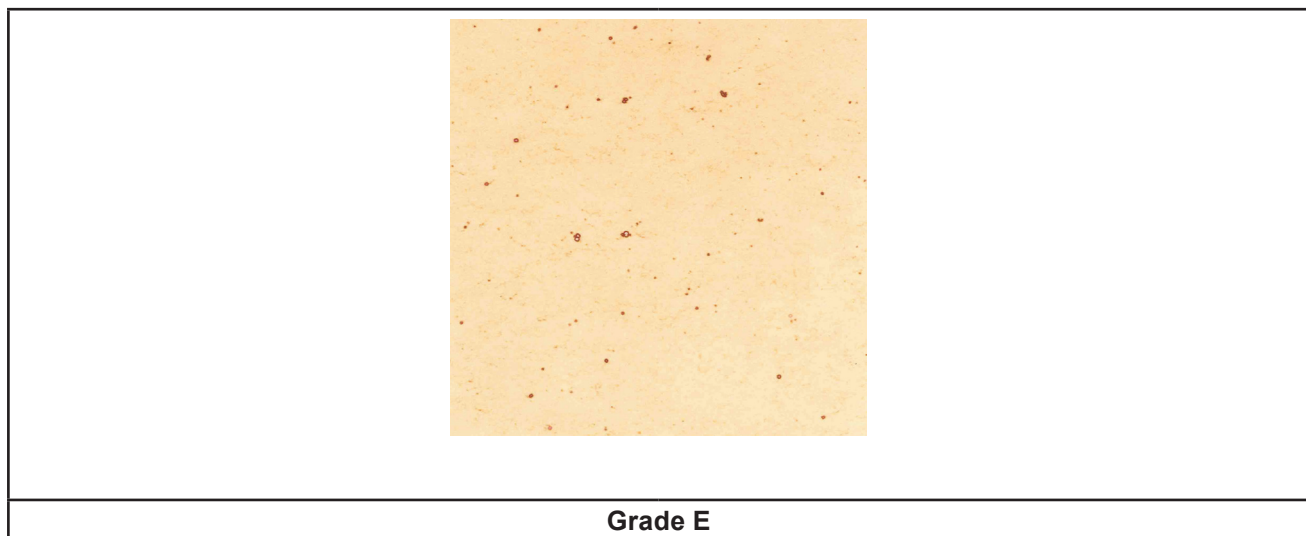


Figure 2 — Cotton-fibre stickiness replicas (colour image)

Bibliography

- [1] HEQUET, E. and ABIDI, N., *Cotton Stickiness: Measurements and Fiber Processing*, Texas Tech University Press, Library of Congress No. ISBN-10: 0-89672-590-1, 2007
- [2] EN 14278-1:2004, *Textiles — Determination of cotton fibre stickiness — Part 1: Method using a manual thermodetection device*
- [3] EN 14278-2:2004, *Textiles — Determination of cotton fibre stickiness — Part 2: Method using an automatic thermodetection plate device*
- [4] EN 14278-3:2004, *Textiles — Determination of cotton fibre stickiness — Part 3: Method using an automatic thermodetection rotating drum device*
- [5] HEQUET, E. and ABIDI, N., Effects of the origin of the Honeydew Contamination on Cotton Spinning Performances, *Textile Res J.* **75**(10), pp. 699-709 (2005)
- [6] FONTENEAU-TAMIME, O., FRYDRYCH, R. and DREAN, J-Y., Carded Spinning of Sticky Cotton. Part I: Stickiness Effects on Productivity, *Textile Res J.* **71**(11), pp. 1023-1030 (2001)
- [7] FONTENEAU-TAMIME, O., FRYDRYCH, R. and GOZE, R., Carded Spinning of Sticky Cotton. Part II: Stickiness Effects on Quality, *Textile Res J.* **71**(12), pp. 1046-1052 (2001)
- [8] HEQUET, E. and ABIDI, N., High-Speed Stickiness Detector Measurement: Effect of Temperature Settings and Relative Humidity, *J. Cotton Sci.* **6**(1), pp. 68-76 (2000)
- [9] FONTENEAU-TAMIME, O., FRYDRYCH, R., and GOZE, R., Qualitative Classification of Cotton Stickiness in the H2SD Speed Stickiness Detector, *Textile Res J.* **70**(10), pp. 866-877 (2000)
- [10] HEQUET, E., ETHRIDGE, D., COLE, B. and WYATT, B., *How Cotton Stickiness Measurements Relate to Spinning Efficiency*, in Proceedings Engineered Fiber Selection System Conference (EFS), Cotton Incorporated, Cary, NC, USA, 2000, pp. 99-121
- [11] YANG, J. S., *Evaluation Method of Cotton Stickiness using Colour Reaction*, in 29th International Cotton Conference, Bremen, Germany, 2008
- [12] YANG, J. S., JIN, S.R., KIM, M. and MOON, H. J., *Evaluation Method of Cotton Stickiness using Colour Reaction*, in 2011 Beltwide Cotton Conference, Atlanta, USA, 2011
- [13] YANG, J. S., JIN, S.R., KIM, M. and MOON, H. J., *Evaluation Method of Cotton Stickiness using Colour Reaction*, in Proceedings of The 11th Asian Textile Conference, Daegu, Korea, 2011, pp. 2032-2037

