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Spices and condiments — Spectrophotometric determination of the extractable colour in paprika

Épices et condiments — Détermination spectrophotométrique de la couleur extractible du paprika

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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 34, *Food products*, Subcommittee SC 7, *Spices, culinary herbs and condiments,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS C01, *Food Products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 7541:1989), which has been technically revised. The main changes compared with the previous edition are as follows:

— estimation using a spectrophotometer has been retained and estimation using coloured glass filters has been deleted;

— the normative references have been updated.

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

This document is based on the ASTA Method 20.1[1].

Spices and condiments — Spectrophotometric determination of the extractable colour in paprika

1 Scope

This document specifies a test method to determine the extractable colour in paprika by measuring the absorbance of an acetone extract of the sample.

It is applicable to ground paprika in every presentation (sweet, hot, smoked, etc).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

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

3.1
extractable colour
soluble matter (extract) in acetone, determined according to the procedure described in this document

3.2
paprika
product obtained by grinding the dry and mature fruits of *Capsicum annuum* L. or *Capsicum frutescens L.*

4 Principle

Extraction from the test sample using acetone. Measurement of the absorbance of the solution obtained using a spectrophotometer at a wavelength of 460 nm.

5 Reagents

All reagents shall be of a recognized analytical grade.

5.1 Acetone.

6 Apparatus

Usual laboratory equipment and, in particular, the following.

6.1 Analytical balance, capable of weighing with a resolution of 0,1 mg.

6.2 Graduated pipette, of 10 ml capacity, class A.

6.3 Spectrophotometer cells, with an optical path length of 1 cm, suitable for the UV-visible range, provided with a lid.

6.4 Spectrophotometer, suitable for measuring absorbance at 460 nm. The calibration and verification of the spectrophotometer shall be carried out with periodicity enough to guarantee the proper development of the test.

6.5 Volumetric flasks, of 100 ml capacity, class A, with ground glass stoppers.

6.6 Sieve, of 850 µm mesh.

6.7 Polystyrene anti-static weigh boats, for analytical balance.

7 Sampling

The laboratory shall receive a truly representative sample, without any damage caused during transport or storage.

The sample shall be protected from light.

8 Test sample preparation

The sample shall be ground so that at least 99 % of the powder (990 g/kg) passes through the sieve of 850 µm mesh (6.6). Mix thoroughly before taking the test portion.

9 Procedure

9.1 Weigh, to the nearest 0,1 mg, around 0,5 g to 0,7 g of paprika, prepared according to Clause 8, into a weigh boat (6.7) and transfer quantitatively into a 100 ml volumetric flask (6.5). Take to the mark with acetone and close with a stopper.

9.2 Shake vigorously. Let the solution stand for 16 h at room temperature, away from light. Shake the flask. Let the solution stand for enough time for the particles to settle.

9.3 Set the wavelength on the spectrophotometer to 460 nm and record the absorbance of the extract using acetone as a blank.

9.4 The recommended range of absorbance A values is from to 0,30 to 0,70. Extracts having A greater than 0,70 should be diluted with acetone to one-half the original concentration. Extracts having A less than 0,30 should be discarded and the extraction performed using a larger sample weight.

10 Method of calculation

The extractable colour, E, in ASTA (American Spice Trade Association) units, is given by Formula (1):

$$E = (A \times 16{,}4) / m \quad (1)$$

where

A is the absorbance of the test sample extract at 460 nm;

m is the mass, in grams, of the test portion.

If any dilution has been made (see 9.4), the relevant dilution factor shall be applied.

The capsanthin concentration *C*, in g/kg, of the undried sample is determined from the extractable colour, *E*, in ASTA units, using Formula (2):

$$C = E \times 0{,}169 \quad (2)$$

NOTE The precision of the method was established in accordance with ISO 5725-2 by an international interlaboratory test. The results of the interlaboratory tests are given in Annex A.

11 Expression of results

The results of the extractable colour shall be expressed in ASTA units and shall be reported to the nearest whole number.

12 Test report

The test report shall contain at least the following information:

a) the method used, including a reference to this document, i.e. ISO 7541:2020;

b) all information necessary for the complete identification of the sample;

c) the results obtained, including a reference to the clause which explains how the results were calculated;

d) any deviations from the procedure;

e) any unusual features observed;

f) all operation details not specified or regarded as optional, as well as any incidents which may have influenced the results;

g) the date of the test.

Annex A
(informative)

Results of the interlaboratory test

The precision of the method was established in accordance with ISO 5725-2 by an international interlaboratory test organized by the Laboratory of the Inspection Service SOIVRE of the DP of the Commerce of Alicante (Ministry of Economy and Competitiveness) of Spain on two different samples of paprika. The results are given in Tables A.1 and A.2.

Table A.1 — Statistical results (Sample 1)

Laboratory	Extractable colouring matter content			Mean (ASTA)
1	141,7	141,9	141,9	141,8
2	142,2	141,6	137,7	140,5
4	144	140	140	141,3
5	140,6	140,9	141,0	140,8
7	138,0	138,0	139,0	138,3
8	142,4	142,8	140,6	141,9
9	133,6	134,1	134,7	134,1
11	135,4	134,6	136,5	135,5
12	144,0	147,0	145,0	145,3
13	138,7	138,8	138,3	138,6
14	141,3	143,8	142,3	142,5
15	144,6	142,9	143,8	143,8
16	136,8	136,6	138,3	137,2
17	136,0	138,0	134,0	136,0
18	132,0	133,0	132,0	132,3
19	133,5	136,9	132,3	134,2
20	138,0	138,0	136,0	137,3
21	143,4	141,5	141,0	142,0
22	137,3	136,3	139,7	137,8
23	139,94	138,59	138,02	138,9
24	138,9	139,7	140,2	139,6
26	145,1	145,0	—	145,1
27	140,8	140,5	139,5	140,3
28	137,9	138,0	138,2	138,0
29	141,1	139,0	140,8	140,3
30	141,8	144,5	142,9	143,1
31	133,2	134,0	137,6	134,9
32	136,4	137,3	136,8	136,8
33	136,7	135,4	136,8	136,3
34	135,6	134,5	136,2	135,4
35	137,6	137,6	138,7	138,0
36	138,9	138,6	139,0	138,8

Table A.1 *(continued)*

Laboratory	Extractable colouring matter content			Mean (ASTA)
37	137,3	136,8	137,8	137,3
38	135	135	135	135,0
39	143,0	142,7	141,3	142,3
40	140,8	141,5	140,2	140,8
Number of laboratories retained after eliminating outliers (p)				36
Mean (m)				138,9
Repeatability standard deviation (s_r)				1,2
Repeatability coefficient of variation ($C_{V,r}$)				0,9
Repeatability limit (r)				3,3
Reproducibility standard deviation (s_R)				3,3
Reproducibility coefficient of variation ($C_{V,R}$)				2,4
Reproducibility limit (R)				9,3
Uncertainty (U), K = 2, P 95 %, where K = coverage factor and P = probability value				0,6

Table A.2 — Statistical results (Sample 2)

Laboratories	Extractable colouring matter content			Mean (ASTA)
1	83,7	82,5	82,8	83,0
2	81,0	80,2	79,0	80,1
3	84,0	82,0	82,0	82,7
4	83	86	82	83,7
5	87,3	87,6	87,3	87,4
6	83,0	86,7	87,7	85,8
7	81,2	81,2	82,4	81,6
8	82,6	83,8	82,8	83,1
9	81,1	81,5	82,2	81,6
10	82,5	81,2	81,6	81,8
11	79,7	81,3	79,1	80,0
12	87,0	86,0	86,0	86,3
13	81,7	82,1	81,5	81,8
14	84,8	86,3	85,4	85,5
15	86,6	86,1	86,4	86,4
16	80,3	81,7	82,1	81,4
17	78,0	77,0	79,0	78,0
19	79,8	80,4	80,6	80,3
20	79,0	84,0	81,0	81,3
21	84,0	84,9	83,9	84,3
22	81,9	80,7	80,4	81,0
23	80,83	80,96	80,36	80,7
24	83,8	83,2	84,1	83,7
26	86,6	85,4	—	86,0
27	83,5	83,2	84,3	83,7
28	82,2	82,0	81,8	82,0
29	82,5	79,1	79,9	80,5