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Chillies — Determination of Scoville index

Piments enragés (dits "de Cayenne") — Détermination de l'indice Scoville

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Foreword

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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.

International Standard ISO 3513 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 7, *Spices and condiments*.

This second edition cancels and replaces the first edition (ISO 3513:1977), of which it constitutes a technical revision.

Annex A forms an integral part of this International Standard.

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Chillies — Determination of Scoville index

1 Scope

This International Standard specifies a method for the determination of the Scoville index of chillies, whole or ground, unadulterated by other spices or products.

NOTE 1 Chillies commonly tested for their pungency are those of the species *Capsicum frutescens* Linnaeus.

2 Normative references

The following standards contain provisions which through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2825:1981, *Spices and condiments — Preparation of a ground sample for analysis*.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*.

ISO 3972:1991, *Sensory analysis — Methodology — Method of investigating sensitivity of taste*.

ISO 6658:1985, *Sensory analysis — Methodology — General guidance*.

ISO 8586-1:1993, *Sensory analysis — General guidance for the selection, training and monitoring of assessors — Part 1: Selected assessors*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 Scoville index: Greatest dilution, i.e. the dilution factor, at which the characteristic pungent sensation from chillies is perceived under the test conditions specified in this International Standard.

3.2 schedule: The particular procedure, adopted in accordance with the test conditions specified in this International Standard and with the expected level of pungency, and designated by an alphabetic code.

4 Principle

Extraction of a test portion with ethanol, and filtration. Preparation of aqueous dilutions of this test portion of different concentrations then determination of the Scoville index by a sensory analysis panel.

5 Reagents

Use only reagents of recognized analytical grade and grade 3 water in accordance with ISO 3696.

5.1 Ethanol, 95 % (V/V) solution.

5.2 Sucrose, 50 g/l solution.

6 Apparatus

Usual laboratory apparatus and, in particular, the following.

6.1 One-mark volumetric flasks, of 50 ml and 100 ml capacity, provided with stoppers.

6.2 Graduated pipettes, of 1 ml capacity, graduated in 0,01 ml divisions.

6.3 One-mark pipettes, of 5 ml capacity.

6.4 Filter paper, medium/fine.

6.5 Beaker, of capacity 50 ml.

6.6 Analytical balance, capable of weighing to an accuracy of $\pm 0,001$ g.

7 Sampling

It is important that the laboratory receive a sample which is truly representative and has not been damaged or changed during transport and storage.

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 948.¹⁾

8 Preparation of test sample

If necessary, prepare the test sample in accordance with ISO 2825.

9 Procedure

9.1 Test portion

On the basis of the expected pungency of the test sample (clause 8), choose from table 1 the mass of the test portion to be used.

NOTE 2 The range of expected pungency should be determined in advance by the test supervisor.

Weigh, to an accuracy of $\pm 0,001$ g, the mass of test sample thus determined and transfer it quantitatively to a 50 ml volumetric flask (6.1).

Note the schedule corresponding to the test portion selected.

9.2 Extraction

Add a sufficient volume of ethanol (5.1) to the flask (6.1) containing the test portion (9.1) to dilute to the mark. Stopper the flask, shake it vigorously for 1 min, and leave it to stand for 30 min.

Carry out a further two times the operation of shaking the flask and leaving it to stand for 30 min. Shake the flask once more and then leave it to stand for 15 h.

Filter the extract through a dry filter paper (6.4) into a 50 ml beaker (6.5).

9.3 Dilution of extract — Applicable only to schedules E and F

9.3.1 For schedule E

Transfer, using a pipette (6.3), 5,0 ml of the extract obtained in 9.2 to a 50 ml volumetric flask (6.1) and dilute to the mark with ethanol (5.1).

9.3.2 For schedule F

Transfer, using a pipette (6.3), 5,0 ml of the extract obtained in 9.2 to a 100 ml volumetric flask (6.1) and dilute to the mark with ethanol (5.1).

9.4 Preparation of dilutions

9.4.1 On the basis of the schedule selected in 9.1, choose from table 2 or 3 (as appropriate) the quantity of extract which, when diluted for tasting (see 9.4.2), will produce a stimulus below the threshold for pungency for any individual assessor.

Table 1 — Mass of test portion and corresponding schedule

Test portion (g)	10,0	5,00	2,00	1,00	0,500	0,250	0,100	0,050	0,050 ¹⁾	0,050 ²⁾
Schedule	A'	B'	C'	D'	A	B	C	D	E	F

1) See 9.3.1.

2) See 9.3.2.

1) ISO 948:1980, *Spices and condiments — Sampling*.

Table 2 — Dilutions for schedules A', B', C' and D'

Quantity (ml) of extract to be used for schedule				Dilution factor ¹⁾
A'	B'	C'	D'	
			0,36	7 000
			0,38	6 500
			0,42	6 000
			0,45	5 500
			0,50	5 000
			0,55	4 500
			0,63	4 000
			0,66	3 800
			0,69	3 600
			0,74	3 400
			0,78	3 200
		0,42	0,83	3 000
		0,43	0,86	2 900
		0,45	0,89	2 800
		0,46		2 700
		0,48		2 600
		0,50		2 500
		0,52		2 400
		0,54		2 300
		0,57		2 200
		0,60		2 100
		0,63		2 000
		0,66		1 900
		0,69		1 800
		0,74		1 700
		0,78		1 600
		0,83		1 500
		0,89		1 400
		0,96		1 300
	0,42	1,04		1 200
	0,46	1,14		1 100
	0,50	1,25		1 000
	0,53			950
	0,56			900
	0,59			850
	0,63			800
	0,67			750
	0,72			700
0,38	0,77			650
0,42	0,83			600
0,46	0,91			550
0,50	1,00			500
0,56				450
0,63				400
0,72				350
0,83				300
1,00				250
1,25				200
1,67				150
2,50				100

1) Take the appropriate value as the Scoville index for the expression of each test result (see clause 10).

Table 3 — Dilutions for schedules A, B, C, D, E and F

Quantity (ml) of extract to be used for schedule				Quantity (ml) of diluted extract to be used for schedule		Dilution factor ¹⁾ × 10 ⁻³
A	B	C	D	E	F	
					0,67	1 500
					0,72	1 400
					0,77	1 300
					0,83	1 200
					0,91	1 100
				0,50	1,00	1 000
				0,53	1,06	950
				0,56	1,11	900
				0,59	1,18	850
				0,63	1,25	800
				0,67	1,33	750
				0,72	1,43	700
				0,77		650
				0,83		600
				0,91		550
				1,00		500
				1,11		450
				1,25		400
				1,43		350
				1,67		300
				2,00		250
				2,50		200
			0,25			175
			0,29			150
			0,33			125
			0,40			100
			0,50			95
		0,26	0,53			90
		0,28	0,56			85
		0,29	0,59			80
		0,31	0,63			75
		0,33	0,67			70
		0,35	0,72			65
		0,38	0,77			60
		0,42	0,83			55
		0,45	0,91			50
		0,50	1,00			45
		0,55				40
		0,63				37
		0,68				34
		0,74				31
		0,80				28
		0,89				26
	0,38	0,96				25
	0,40	1,00				24
	0,42					22
	0,46					20
	0,50					18
	0,56					16
	0,63					14
	0,72					12
	0,83					

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Quantity (ml) of extract to be used for schedule				Quantity (ml) of diluted extract to be used for schedule		Dilution factor ¹⁾ × 10 ⁻³
A	B	C	D	E	F	
0,50	1,00					10
0,53	1,11					9,5
0,56	1,25					9,0
0,59						8,5
0,63						8,0
0,67						7,5
0,72						7,0
0,77						6,5
0,83						6,0
0,91						5,5

1) Multiply the appropriate value by 1 000 to give the Scoville index for the expression of each test result (see clause 10).

9.4.2 Take, using a graduated pipette (6.2), the quantity of extract thus determined and transfer it to a 50 ml volumetric flask (6.1). Dilute to the mark with the sucrose solution (5.2). Code the flask for identification.

9.4.3 Prepare five other dilutions, using the same procedure as in 9.4.2, but using the next five consecutive quantities of extract listed in table 2 or 3 (as appropriate).

EXAMPLE

Assume that the schedule selected in 9.1 is C'. Then, with reference to table 2, the quantity of extract which, when diluted for tasting, will produce a stimulus below the threshold for pungency for any individual assessor is chosen as 0,48 ml. This quantity of extract is diluted as specified in 9.4.2. Five other dilutions are prepared (see 9.4.3) using 0,50 ml, 0,52 ml, 0,54 ml, 0,57 ml and 0,60 ml respectively of extract.

9.5 Tasting

9.5.1 General

For general guidance on sensory analysis, see ISO 6658.

For guidance on the selection and training of assessors, see ISO 8586-1, and for guidance on investigation of the sensitivity of taste of assessors, see ISO 3972.

9.5.2 Panel

Constitute a tasting panel by selecting five assessors from a group of selected assessors (see annex A).

9.5.3 Tasting session

Prepare five sample series (i.e. one sample series per assessor), each sample series being constituted as follows.

Transfer to six beakers 5 ml ± 0,1 ml of each of the dilutions prepared in 9.4.2 and 9.4.3 (one dilution per beaker).

Present a sample series (comprising six beakers) thus prepared to each of the assessors.

Instruct them to sip or to rinse their mouths with water at a temperature of between 35 °C and 40 °C before and after tasting each sample. Instruct each assessor to swallow each sample at 5 min intervals, starting with the weakest dilution, until the characteristic pungent sensation of chillies is tasted between 20 s and 30 s after swallowing. Note the dilution ratio of the sample for which each assessor first reports a positive response.

Referring to table 2 or 3 (as appropriate), record the dilution factor of the sample for which each assessor reports a positive response.

If the range of the highest dilution factors recorded for at least three assessors corresponds to more than two consecutive dilution factors, it is recommended that the procedures described in 9.5 be repeated, but allowing an interval of at least 90 min between tastings. The previous results are then disregarded.

In addition, at least four out of the five assessors should give a positive response to the lowest dilution. If this is not the case, it is recommended to verify the validity of the jury and to repeat the test, the previous results being disregarded.

10 Expression of results

Express the Scoville index for the product as the highest value of the dilution factor recorded for at least three of the assessors in 9.5.3.

11 Test report

The test report shall specify:

- the method in accordance with which sampling was carried out (if known),
- the method used,

- the schedule chosen,
- the test result(s) obtained, and
- the response of each assessor if the range of all the responses spans more than three consecutive dilution factors.

It shall also mention all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the result.

The test report shall include all information necessary for the complete identification of the sample.

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Annex A (normative)

Choice of assessors and constitution of the panel

A.1 From a group of qualified subjects, previously chosen according to the specifications of ISO 8586-1, the supervisor shall choose and train the number of subjects required for the panel.

NOTE 3 The number of subjects should be one and a half to two times the number finally necessary.

The supervisor shall not join the panel.

A.2 Subjects who have been exposed, within the preceding 90 min, to other chilli samples or to highly seasoned foods shall be temporarily excluded.

A.3 Care shall be taken to ensure that the panel so constituted is coherent, both with regard to the level of taste sensitivity of each of the subjects (see ISO 3972) and to their stimulus threshold to the heat sensation of chillies.

A.4 The stimulus threshold for determining the Scoville index is the onset of the heat sensation between 20 s and 30 s after swallowing a sample.

The heat sensation of chillies in food is felt in the mouth and throat. After training, assessors should expect to have the same specific sensation when tasting chillies in solution and should report a positive response only if that sensation is perceived.

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