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Curry powder — Specification

Poudre de curry — Spécifications

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 2253 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 7, *Spices and condiments*.

This third edition cancels and replaces the second edition (ISO 2253:1986), which has been technically revised.

Annexes B and C form a normative part of this International Standard. Annex A is for information only.

INTERNATIONAL STANDARD **ISO 2253:1999(E)**

Curry powder — Specification

1 Scope

This International Standard specifies the requirements for curry powder, which is used as a flavouring ingredient in the preparation of foods and is traded internationally.

Recommendations relating to conditions for storage and transport are given in annex A.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 676, *Spices and condiments — Botanical nomenclature.*

ISO 928, *Spices and condiments — Determination of total ash.*

ISO 930, *Spices and condiments — Determination of acid-insoluble ash.*

ISO 939, *Spices and condiments — Determination of moisture content — Entrainment method.*

ISO 948, *Spices and condiments — Sampling.*

ISO 1208, *Spices and condiments — Determination of filth.*

ISO 6571, *Spices, condiments and herbs — Determination of volatile oil content.*

3 Specifications

3.1 Description and composition

3.1.1 Curry powder is the product obtained by grinding and mixing clean, dry and sound spices and condiments. Any of the spices and condiments listed in ISO 676 may be used.

3.1.2 The proportion of spices and condiments used in curry powder shall be not less than 85 % (mass fraction). The spices and condiments comprising the mixture shall be in conformity with the requirements of relevant International Standards, if these exist.

3.1.3 Curry powder may contain edible starchy material (the nature of which shall be declared), and the extent of which shall be determined in accordance with the method given in annex B. It may contain food-grade sodium chloride in a proportion not exceeding 5 % (mass fraction) when determined in accordance with the method given in annex C. Curry powder shall be free from artificial colourings (unless specifically authorized by national legislation).

3.2 Odour and flavour

The flavour of the curry powder shall be typical of the product, clean, fresh and pungent. It shall have no foreign odour and shall be free from rancidity or mustiness.

NOTE The curry powder may be more or less pungent according to its composition.

3.3 Freedom from insects, moulds, etc.

The curry powder shall be free from dead insects, insect fragments and rodent contamination visible to the naked eye (corrected, if necessary, for abnormal vision) or with such magnification as may be necessary in any particular case. If the magnification exceeds 10 ×, this fact shall be mentioned in the test report.

In case of dispute, the contamination of the curry powder shall be determined by the method described in ISO 1208.

3.4 Freedom from coarse particles

The curry powder shall be free from coarse particles and shall be of the fineness specified in national standards or as required by the buyer.

3.5 Chemical requirements

The curry powder shall also comply with the requirements given in Table 1 when tested by the specified methods.

Table 1 — Chemical requirements for curry powder

Characteristic	Requirement	Test method
Moisture content, % (mass fraction), max.	10	ISO 639
Acid-insoluble ash, % (mass fraction), on dry basis, max.	2,0	ISO 930
Volatile oil content, ml/100 g, on dry basis, min.	0,25	ISO 6571

4 Sampling

Sampling shall be carried out by the method specified in ISO 948.

5 Test methods

The samples of curry powder shall be analysed to assure their conformity to the requirements of this International Standard, following the test methods indicated in 3.1.3, 3.3 and Table 1.

6 Packaging and marking

6.1 Packaging

Curry powder shall be packed in sealed, clean and sound containers made of a material which does not affect the product and which protects it from the ingress of moisture and from loss of volatile matter.

The packaging shall also comply with any national legislation relating to environmental protection.

6.2 Marking

The following indications shall be marked directly on each package or shall be marked on a label attached to the package:

a) name of the product, tradename or brand name, if applicable;

b) name and address of the manufacturer or the packer;

c) batch or code number;

d) net mass;

e) producing country;

f) in countries where legislation make this obligatory, the names of the spices, condiments and other ingredients used in the preparation of the curry powder, in descending order of their proportion by mass;

g) declaration of starch, if added, and its nature;

h) any other information required by the purchaser, such as the date of packing and possible reference to this International Standard.

Annex A
(informative)

Recommendations relating to conditions of storage and transport

The curry powder should be manufactured and packed under hygienic conditions.

The packs of curry powder should be stored in covered premises, well protected from the sun, rain and excessive heat.

The storeroom should be dry, free from objectionable odour, and proofed against entry of insects and vermin. The ventilation should be controlled so as to give good ventilation under dry conditions and to be fully closed under damp conditions. In a storage warehouse, suitable facilities should be available for fumigation.

The packs should be so handled and transported that they are protected from rain, from sun or any other source of excessive heat, from objectionable odours and from cross-infestation, especially in the holds of ships.

Annex B
(normative)

Determination of starch — Acid hydrolysis method

B.1 Principle

Extracted starch from the curry powder is hydrolysed and titrated against standard Fehling's solution and the dextrose content in the sample is initially determined. The dextrose content is determined from the titre value and the starch content is calculated from this.

B.2 Reagents

B.2.1 Diethyl ether

B.2.2 Ethanol, 10 % (volume fraction).

B.2.3 Hydrochloric acid, 2,5 % (volume fraction), prepared by mixing 20 ml of concentrated hydrochloric acid (ρ = 1,16 g/ml) and 200 ml of water.

B.2.4 Sodium carbonate solution, of concentration 20 g/l.

B.2.5 Stock solution of dextrose

Weigh accurately 10 g of anhydrous dextrose into a one-mark 1 000 ml graduated flask and dissolve it in water. Add to this solution 2,5 g of benzoic acid. Shake to dissolve the benzoic acid and dilute to the mark with water. This solution should not be used after 48 h.

B.2.6 Standard solution of dextrose

Dilute a known aliquot portion of the stock solution of dextrose (B.2.5) with water containing 0,25 g/l of benzoic acid to such a concentration that more than 15 ml but less than 50 ml of it will be required to reduce all the copper in the Fehling's solution (B.2.8) taken for titration. Note the concentration of anhydrous dextrose in this solution in milligrams per 100 ml (see note). Prepare a fresh solution everyday.

NOTE When 10 ml of Fehling's solution are taken for titration, a standard dextrose solution containing 0,11 g/l to 0,30 g/l of anhydrous dextrose is convenient for use.

B.2.7 Methylene blue indicator solution

Dissolve 0,2 g of Methylene blue in water and dilute to 100 ml.

B.2.8 Fehling's solution (Soxhlet modification)

B.2.8.1 Preparation

Mix immediately before use, equal volumes of solution A and solution B which are prepared as follows.

a) **Solution A**: dissolve 34,64 g of copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) in water in a 500 ml volumetric flask. Add 0,5 ml of concentrated sulfuric acid (ρ = 1,84 g/ml) and dilute to 500 ml. Filter or decant, if necessary.

b) **Solution B**: dissolve 173 g of potassium sodium tartrate ($KNaC_4H_4O_6 \cdot 4H_2O$) and 50 g of sodium hydroxide in a volumetric flask. Dilute to 500 ml and allow the solution to stand for 2 days. Filter or decant this solution, if necessary.

B.2.8.2 Standardization of Fehling's solution

Pour the standard dextrose solution (B.2.6) into a 50 ml burette (see note 2). Find the titre (i.e. the volume of standard dextrose solution required to reduce all the copper in 10 ml of Fehling's solution) corresponding to the concentration of the standard dextrose solution, using Table B.1.

NOTE 1 If, for example, the standard dextrose solution contains 167,0 mg of anhydrous dextrose per 100 ml, the corresponding titre would be 30 ml.

Pipette 10 ml of Fehling's solution into a 300 ml conical flask and run in from the burette almost the whole of the standard dextrose solution required to effect reduction of all the copper, so that not more than 1 ml will be required later to complete the titration. Gently boil the contents of the flask for 2 min. At the end of 2 min of boiling, add, without interrupting boiling, 1 ml of Methylene blue indicator solution (B.2.7). While the contents of the flask continue to boil, begin to add standard dextrose solution (B.2.6) (one or two drops at a time) from the burette until the blue colour of the indicator just disappears. The titration should be completed within 1 min, so that the contents of the flask boil for 3 min altogether without interruption. Record the titre.

Multiply the titre (obtained by direct titration) by the number of milligrams of anhydrous dextrose in 1 ml of the standard dextrose solution to obtain the dextrose factor. Compare this factor with the dextrose factor given in Table B.1 and determine the correction, if any, to be applied to the dextrose factors derived from Table B.1.

NOTE 2 In adding the dextrose solution to the reaction mixture, the burette may be held in the hand over the flask. The burettes may be fitted with a small outlet tube, bent twice at right angles, so that the body of the burette may be kept out of the steam while adding the solution. Burettes with glass taps are unsuitable for this work as the taps become heated by the steam and are liable to jam.

It should be noted that with both incremental and standard methods of titration, the flask containing the reaction mixture is left on the wire gauze over the flame throughout the titration.

B.2.8.3 Example

Concentration of anhydrous dextrose in the standard dextrose solution:	167,0 mg per 100 ml
Titre obtained by direct titration:	30,1 ml
Dextrose factor for 30,1 ml of standard dextrose solution:	Titre, in millilitres, × number of milligrams of anhydrous dextrose in 1 ml of standard dextrose solution $= 30{,}1 \times 1{,}670 = 50{,}267$
Dextrose factor for 30,1 ml of standard dextrose solution from Table B.1 (calculated by interpolation):	50,11
Correction to be applied to the dextrose factors derived from Table B.1:	$50{,}267 - 50{,}11 = 0{,}157$

B.3 Apparatus

Usual laboratory apparatus and, in particular, the following.

B.3.1 **One-mark volumetric flasks**, of capacity 1 000 ml, 500 ml and 250 ml.

B.3.2 **Analytical balance**, capable of weighing to an accuracy of ± 0,001 g.

B.3.3 **Burette**, of capacity 50 ml.

B.3.4 **Conical flasks**, of capacity 300 ml.

B.3.5 **Reflux condenser**

B.4 Procedure

B.4.1 Preparation of test solution

Extract 0,5 g of curry powder, accurately weighed, with five 10 ml portions of diethyl ether (B.2.1), then pass the solution through a filter paper that will retain completely the smallest starch granules. Evaporate the diethyl ether from the residue and wash with 150 ml of ethanol (B.2.2). Carefully wash off the residue from the filter paper with 200 ml of cold water. Heat for 2 h the undissolved residue with 220 ml of dilute hydrochloric acid (B.2.3) in a flask equipped with a reflux condenser (B.3.5). Cool and neutralize with sodium carbonate solution (B.2.4). Transfer the solution quantitatively to a 250 ml flask and dilute to the mark with water.

B.4.2 Incremental method of titration

Pour the test solution (B.4.1) into a 50 ml burette (the solution may be filtered if not clear) (see note 2 in B.2.8.2). Pipette 10 ml of Fehling's solution (B.2.8) into a 300 ml conical flask and run in from the burette 15 ml of the solution. Without further dilution, heat the contents of the flask over a wire gauze, and boil. After the liquid has been boiling for about 15 s, it will be possible to judge if almost all the copper has been reduced, then add 1 ml of Methylene blue indicator solution (B.2.7). Continue boiling the contents of the flask for 1 min to 2 min from the commencement of boiling, and then add the solution from the burette in small quantities (1 ml or less at a time), allowing the liquid to boil for about 10 s between successive additions, until the blue colour of the indicator just disappears (see note 1).

In the case where there still appears to be much unreduced copper after the mixture of Fehling's solution with 15 ml of the prepared solution has been boiling for 15 s, add the solution from the burette in larger increments (more than 1 ml at a time, according to judgement), and allow the mixture to boil for 15 s after each addition.

Repeat the addition of the solution at intervals of 15 s until it is considered unsafe to add a large increment of the test solution. At this stage continue the boiling for an additional 2 min, then add 1 ml of indicator and complete the titration by adding the test solution in small quantities (less than 1 ml at a time) (see note 2).

NOTE 1 It is advisable not to add the indicator until the endpoint has been nearly reached, because the indicator retains its full colour until the endpoint is almost reached and thus gives no warning to the operator to go slowly.

NOTE 2 When the operator has had some experience with the method, a sufficiently accurate result may often be obtained by a single estimation by the incremental method of titration. For the utmost degree of accuracy of which the method is capable, a second titration should be carried out by the standard method of titration (B.4.3).

B.4.3 Standard method of titration

Pipette 10 ml of Fehling's solution (B.2.8) into a 300 ml conical flask and run in from the burette almost the whole of the test solution required to effect reduction of all the copper (determined under B.4.2) so that, if possible, not more than 1 ml will be required to complete the titration. Gently boil the contents of the flask for 2 min. At the end of 2 min of boiling, add, without interrupting the boiling, 1 ml of Methylene blue indicator solution (B.2.7). While the contents of the flask continue to boil, begin to add the solution (one or two drops at a time) from the burette until the blue colour of the indicator just disappears (see note 1 in B.4.2). The titration should be completed within 1 min so that the contents of the flask boil altogether for 3 min without interruption.

B.5 Calculation

B.5.1 Refer to Table B.1 for the dextrose factor corresponding to the titre (determined as given under B.4.3) and apply the correction previously determined under B.2.8.2. Calculate the dextrose content of the test solution (B.4.1) as follows:

$$m = \frac{f}{V_\mathrm{T}}$$

where

m is the mass, in milligrams, of anhydrous dextrose present in 1 ml of the test solution;

f is the dextrose factor;

V_T is the titre used.

Instead of using 10 ml of Fehling's solution, a 25 ml portion may also be substituted throughout the procedure [including standardization of the Fehling's solution (B.2.8.2)]. In this case, the standard dextrose solution used in standardizing the Fehling's solution, and the test solution (B.4.1), should contain 0,25 g/l to 0,75 g/l of anhydrous dextrose, and Table B.2 should be used for the calculation.

Tables B.1 and B.2 show, for the standard method of titration, the values corresponding to integral millilitres of the sugar solutions, intermediate values being obtained by interpolation.

B.5.2 The starch content (on dry basis), w_S, as a mass fraction in percent, is given by:

$$w_\mathrm{S} = \frac{9{,}3\, m_\mathrm{D} V}{m_\mathrm{c}(100 - w_\mathrm{M})}$$

where

m_D is the mass, in milligrams, of anhydrous dextrose in 1 ml of solution (B.2.5);

V is the total volume, in millilitres, of the test solution (B.4.1);

m_C is the mass, in grams, of the curry powder used to prepare V ml of the test solution;

w_M is the moisture content of the curry powder, as a mass fraction in percent.

Table B.1 — Dextrose factor for 10 ml of Fehling's solution

Titre ml	Dextrose factor f [a]	Dextrose content per 100 ml of solution mg
15	49,1	327
16	49,2	307
17	49,3	289
18	49,3	274
19	49,4	260
20	49,5	247,4
21	49,5	235,8
22	49,6	225,5
23	49,7	216,1
24	49,8	207,4
25	49,8	199,3
26	49,9	191,8
27	50,0	184,9
28	50,0	178,5
29	50,0	172,5
30	50,1	167,0
31	50,2	161,8
32	50,2	156,9
33	50,3	152,4
34	50,3	148,0
35	50,4	143,9
36	50,4	140,0
37	50,5	136,4
38	50,5	132,9
39	50,6	129,6
40	50,6	126,5
41	50,7	123,6
42	50,7	120,8
43	50,8	118,1
44	50,8	115,5
45	50,9	113,0
46	50,9	110,6
47	51,0	108,4
48	51,0	106,2
49	51,0	104,1
50	51,1	102,2

If the value obtained is not comparable with the value given in this table, then the standard sample of anhydrous dextrose shall be rechecked.

[a] Milligrams of anhydrous dextrose corresponding to 10 ml of Fehling's solution.

Table B.2 — Dextrose factor for 25 ml of Fehling's solution

Titre ml	Dextrose factor f [a]	Dextrose content per 100 ml of solution mg
15	120,2	801
16	120,2	751
17	120,2	707
18	120,2	668
19	120,3	638
20	120,3	601,5
21	120,3	572,9
22	120,4	547,3
23	120,4	523,6
24	120,5	501,9
25	120,5	482,0
26	120,6	463,7
27	120,6	446,8
28	120,7	431,0
29	120,7	416,4
30	120,8	402,7
31	120,8	389,7
32	120,8	377,6
33	120,9	366,3
34	120,9	355,6
35	121,0	345,6
36	121,0	336,3
37	121,1	327,4
38	121,2	318,8
39	121,2	310,7
40	121,2	303,1
41	121,3	295,9
42	121,4	289,0
43	121,4	282,4
44	121,5	276,1
45	121,5	270,1
46	121,6	264,3
47	121,6	258,8
48	121,7	253,5
49	121,7	248,4
50	121,8	243,6

If the value obtained is not comparable with the value given in this table, then the standard sample of anhydrous dextrose shall be rechecked.

[a] Milligrams of anhydrous dextrose corresponding to 25 ml of Fehling's solution.

Annex C
(normative)

Determination of sodium chloride content

C.1 Reagents

C.1.1 Dilute nitric acid

Dilute 1 volume of concentrated nitric acid (ρ = 1,42 g/ml) with 4 volumes of water. Boil the solution until it becomes colourless, to remove lower oxides of nitrogen.

C.1.2 Standard silver nitrate solution, of concentration 0,1 mol/l.

C.1.3 Iron(III) indicator solution, saturated solution of iron(III) ammonium sulfate [$FeNH_4(SO_4)_2 \cdot 12H_2O$].

C.1.4 Standard potassium thiocyanate solution, of concentration 0,1 mol/l.

C.2 Apparatus

C.2.1 Platinum dish

C.2.2 Erlenmeyer flask

C.3 Procedure

Weigh about 5,0 g of the curry powder in a platinum dish and obtain the total ash in accordance with the method specified in ISO 928. Dissolve the ash in hot water. Filter and wash the dish and residue thoroughly with hot water until it is free from chlorides. Collect the filtrate and the washings in the Erlenmeyer flask (C.2.2). Add a known volume of the standard silver nitrate solution (C.1.2) slightly in excess, 5 ml of the indicator solution (C.1.3) and a few millilitres of dilute nitric acid (C.1.1). Titrate the excess silver nitrate with the standard potassium thiocyanate solution (C.1.4) until a permanent light-brown colour appears.

C.4 Calculation

Calculate the sodium chloride content by means of the following equation:

$$w = \frac{5{,}85(V_1C_1 - V_2C_2}{m}$$

where

w is the sodium chloride content, as a mass fraction in percent;

V_1 is the volume, in millilitres, of the standard silver nitrate solution;

C_1 is the concentration of the standard silver nitrate solution, in moles per litre;

V_2 is the volume, in millilitres, of the standard potassium thiocyanate solution used;

C_2 is the concentration of the standard potassium thiocyanate solution in moles per litre;

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

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