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DRAFT EAST AFRICAN STANDARD

Curry powder — Specification

EAST AFRICAN COMMUNITY

Second Edition 2017

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards. XXXXXX.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 006, *Spices culinary herbs and condiments*.

This second edition cancels and replaces the first edition (EAS 98: 1999), which has been technically revised.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Curry powder — Specification

1 Scope

This Draft East African Standard specifies the requirements and the methods of sampling and test for curry powder, which is used as a flavouring material in the preparation of foods.

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.

EAS 38, *General standard for the labelling of pre-packaged foods*

EAS 99, *Spices and condiments —Terminology*

EAS 100, *Food stuffs — Determination of lead*

ISO 948, *Spices and condiments — Sampling*

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

ISO 6633, *Fruits, vegetables and derived products — Determination of lead content — Flameless atomic absorption spectrometric method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EAS 99 and the following apply.

Curry powder
is a product used as a condiment prepared by grinding clean and wholesome spices, aromatic herbs and seeds and sometime starch and salts added to it.

4 Requirements

Curry powder shall be prepared by grinding clean, dried and sound spices and condiments. The major ingredients shall include turmeric, coriander, cumin, fenugreek and mustard. In addition any of the spices and condiments listed in EAS 99 may be used. The proportion of spices used in curry powder shall not be less than 85%. 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 A.

4.2 General requirements

Curry powder shall:

a) have characteristic fresh taste and odour of the designated product ,

b) be free from dirt, fungal growth and insect infestation.

c) be free from added colouring, flavouring substances and preservatives other than salt.

4.3 Specific requirements

4.3.1 Curry powder shall comply with the requirements in Table 1.

Table 1 — Requirements for curry powder

S/No	Characteristics	Requirements	Test method
i)	Moisture percent m/m max.	10.00	ISO 939
ii)	Volatile oil ml/100g min.	0.25	ISO 6571
iii)	Non-volatile ether extract percent m/m, min.	7.5	ISO 1108
iv)	Acid insoluble ash in hydrochloric acid percent m/m max.	1.0	ISO 930
v)	Salt percent m/m max.	5.0	Annex B
vi)	Crude fibre percent max.	15.0	Annex C

4.3.2 Curry powder shall be ground to such fineness that all of it passes through a sieve of 500 micron (0.500 mm) and nothing remains on the sieve.

5 Food additives

Curry powder shall be free from added colouring matter and preservatives other than salt

6 Contaminants

6.1 Pesticide residues

Pesticide residues in curry powder shall not exceed maximum residue limit as established in the Codex online guideline for pesticide residues in food.

6.2 Heavy metal

Heavy metals in curry powder shall not exceed maximum residue limit as stipulated in Codex Stan 193.

6.3 Aflatoxin limits.

Total aflatoxin shall not exceed 10 µg/L and aflatoxin B1 shall not exceed 5 µg/L when tested with ISO 16050

7 Hygiene

Curry powder shall be manufactured and handled in a hygienic manner in accordance with EAS 39 and shall conform to the microbiological limits stipulated in Table 2.

Table 2 — Microbiological requirements

S/No	Characteristic	Requirements	Test method
i)	Total plate count, cfu/g, max	$1x10^5$	ISO 4833-1
ii)	Yeast and mould, cfu/g, max.	$1x10^3$	ISO 7954
iii)	*Salmonella spp*. per 25 g	Absent	ISO 6579
iv)	*E. coli*, MPN/g, max.	Absent	ISO 7251

8 Weights and measures

The weight and fill of the curry powder shall comply with the weights and measures regulations of Partner States or equivalent legislation.

9 Packaging

9.1 Curry powder shall be packed in clean and sound container made of food grade material and sealed with temper-proof seal. The container shall be made of a material which does not impart any smell or react with curry powder and protects it from ultra-violet radiation, ingress of moisture and loss of volatile matter.

9.2 The packaging material shall be easy to sterilize, shall not be a source of contamination, and shall protect the product safety and quality during transportation and storage.

10 Labelling

The product shall be legibly and indelibly labelled in compliance with the requirements of EAS 38. In addition the following information shall appear legibly on each container:

a) name of the product;

b) trade name or brand name if any;

c) name, physical and postal a address of manufacturer and / or packer;

d) batch or code number;

e) net weight;

f) a complete list of ingredients in descending order of proportions;

g) storage conditions; and

h) manufacturing and expire date.

10 Sampling

Sampling shall be carried out in accordance with ISO 948.

Annex A
(normative)

Determination of starch — Acid hydrolysis method

A.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.

A.2 Reagents

A.2.1 Diethyl ether

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

A.2.3 Hydrochloric acid, 2.5 % (volume fraction), prepared by mixing 20 ml of concentrated hydrochloric acid (density = 1.16 g/ml) and 200 ml of water.

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

A.2.5 Stock solution of dextrose

Weigh accurately 10 g of anhydrous dextrose into a one-mark 1000 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 hours.

A.2.6 Standard solution of dextrose

Dilute a known aliquot portion of the stock solution of dextrose (A.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 (A.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 every day.

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.

A.2.7 Methylene blue indicator solution

Dissolve 0.2 g of Methylene blue in water and dilute to 100 ml.

A.2.8 Fehling's solution (Soxhlet modification)

A.2.8.1 Preparation

Mix immediately before use, equal volumes of solution A and solution 8 which are prepared as follows.

Solution A: dissolve 34.64 g of copper sulfate pentahydrate ($CuSO_4.5H_20$) in water in a flask. Add 0.5 ml of concentrated sulfuric acid (p = 1.84 g/ml) and dilute to 500 ml. Filter or decant if necessary.

Solution B: dissolve 173 g of potassium sodium tartrate ($KNaC_4H_4O_6$-$4H_2O$) 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.

A.2.8.2 Standardization of Fehling's solution

Pour the standard dextrose solution (A.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 A.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 (A.2.7). While the contents of the flask continue to boil, begin to add standard dextrose solution (A.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 A.1 and determine the correction, if any, to be applied to the dextrose factors derived from Table A.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.

A.2.8.3 Example

Concentration of anhydrous dextrose in the standard dextrose solution: 67.0 mg per 100 ml

Titre obtained by direct titration: 30.1 ml

Dextrose factor for 30.1 ml of standard = Titre in milliliters x number of milligrams of anhydrous dextrose solution = 30.1 x 1.670 = 50.267

Dextrose factor for 30.1 ml of standard dextrose solution from Table A.1 (calculated by interpolation): 50.11

Correction to apply to the dextrose factor derived from Table A.1 50.267-50.11=0.57

A.3 Apparatus

Usual laboratory apparatus and, in particular, the following.

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

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

A.3.3 Burette, of capacity 50 ml.

A.3.4 Conical flasks, of capacity 300 ml.

A.3.5 Reflux condenser

A.4 Procedure

A.4.1 Preparation of test solution

Extract 0.5 g of curry powder, accurately weighed, with five 10 ml portions of diethyl ether (A.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 (A.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 (A.2.3) in a flask equipped with a reflux condenser A.3.5). Cool and neutralize with sodium carbonate solution (A.2.4). Transfer the solution quantitatively to a 250 ml flask and dilute to the mark with water.

A.4.2 Incremental method of titration

Pour the test solution (A.4.1) into a 50 ml burette (the solution may be filtered if not clear) (see note 2 in A.2.8.2). Pipette 10 ml of Fehling's solution (A.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 wire gauze, and boil. After the liquid has been boiling for about 15 seconds, it will be possible to judge if almost all the copper has been reduced, then add 1 ml of Methylene blue indicator solution (A.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 seconds 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 seconds, add the solution from the burette in larger increments (more than 1 ml at a time, according to judgment), and allow the mixture to boil for 15 seconds after each addition.

Repeat the addition of the solution at intervals of 15 seconds 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 a second titration should be carried out by the standard method of titration (A.4.3).

A.4.3 Standard method of titration

Pipette 10 ml of Fehling's solution (A.2.8) into a 300 ml conical flask and run in from the burette aim the test solution required to effect reduction of all the copper (determined under A.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 2 min of boiling, add, without interrupting the boiling, 1 ml of Methylene blue indicator solution contents of the

flask continue to boil, begin to add the solution (one or two drops at a time) from the burette until colour of the indicator just disappears (see note 1 in A.4.2). The titration should be completed within 1 min so that the contents of the flask boil altogether for 3 min without interruption.

A.5 Calculation

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

$$m = \frac{f}{V_T}$$

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 A.2.8.2)). In this case, the standard dextrose solution used in standardizing the Fehling's solution, and the test solution (A.4.1), should contain 0.25 g/l to 0.75 g/l of anhydrous dextrose, and Table A.2 should be used for the calculation.

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

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

$$W_s = \frac{9.3\, m_D V}{m_c\,(100 - w_M)}$$

Where:

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

V is the total volume, in millilitres, of the test solution (A.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 A.1 — Dextrose factor for 10 ml of Fehling's solution

S/No.	Titre (ml)	Dextrose factor (F^a)	Dextrose content per 100 ml of solution (mg)
1)	15	49.1	327
2)	16	49.2	307
3)	17	49.3	289
4)	18	49.3	274
5)	19	49.4	260
6)	20	49.5	247.4
7)	21	49.5	235.8
8)	22	49.6	225.5
9)	23	49.7	216.1
10)	24	49.8	207.4
11)	25	49.8	199.3
12)	26	49.9	191.8
13)	27	50.0	184.9
14)	28	50.0	178.5
15)	29	50.0	172.5
16)	30	50.1	167.0
17)	31	50.2	161.8
18)	32	50.2	156.9
19)	33	50.3	152.4
20)	34	50.3	148.0
21)	35	50.4	143.9
22)	36	50.4	140.0
23)	37	50.5	136.4
24)	38	50.5	132.9
25)	39	50.6	129.6
26)	40	50.6	126.5
27)	41	50.7	123.6
28)	42	50.7	120.8
29)	43	50.8	118.1
30)	44	50.8	115.5
31)	45	50.9	113.0
32)	46	50.9	110.6
33)	47	51.0	108.4
34)	48	51.0	106.2
35)	49	51.0	104.1
36)	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. Fehling's solution.

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

S/No.	Titre (ml)	Dextrose factor (F^a)	Dextrose content per 100 ml of solution (mg)
1)	15	120.2	801
2)	16	120.2	751
3)	17	120.2	707
4)	18	120.2	668
5)	19	120.3	638
6)	20	120.3	601,5
7)	21	120.3	572,9
8)	22	120.4	547,3
9)	23	120.4	523,6
10)	24	120.5	501,9
11)	25	120.5	482,0
12)	26	120.6	463,7
13)	27	120.6	446,8
14)	28	120.7	431,0
15)	29	120.7	416,4
16)	30	120.8	402,7
17)	31	120.8	389,7
18)	32	120.8	377,6
19)	33	120.9	366,3
20)	34	120.9	355,6
21)	35	121.0	345,6
22)	36	121.0	336,3
23)	37	121.1	327,4
24)	38	121.2	318,8
25)	39	121.2	310,7
26)	40	121.2	303,1
27)	41	121.3	295,9
28)	42	121.4	289,0
29)	43	121.44	282,4
30)	44	121.5	276,1
31)	45	121.5	270,1
32)	46	121.6	264,3
33)	47	121.6	258,8

34)	48	121.7	253,5
35)	49	121.7	248,4
36)	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 B
(normative)

Determination of salt (Sodium chloride)

B.1 Reagents

B.1.1 Dilute nitric acid: One volume of concentrated nitric acid (relative density 1.42) diluted with 4 volumes of water and freed from lower oxides of nitrogen by boiling until colourless.

B.1.2 Standard silver nitrate solution 0.1 N

B.1.3 Ferric indicator solution: Saturated solution of ferric ammonium sulphate [$FeNH_4.(SO_4)_2\ 2H_2O$]

B.1.4 Standard potassium thiocyanate solution 0.1 N

B.2 Procedure:

Weigh accurately about 2-5 g of the material in a dish preferably of platinum and obtain the total ash as described in ISO 928 Dissolve the ash in hot water. Filter and wash the dish and residue thoroughly with hot water till it is free from chlorides. Collect the filtrate and washings in an Erlenmeyer flask. Add a known volume of the standard silver nitrate solution in slight excess, 5 ml of the ferric indicator solution and a few milliliters of nitric acid. Titrate the excess silver nitrate with the standard potassium thiocyanate solution until permanent light brown colour appears

B.3 Calculation

Sodium chloride per cent by mass = $\frac{5.85\ (V_1N_1 - V_2N_2)}{M}$

Where:

V_1= Volume in ml of the standard silver nitrate solution used

N_1= Normality of the standard silver nitrate solution used

V_2= Volume in ml of the standard potassium thiocyanate solution and

N_2= Normality of the standard potassium thiocyanate solution and

M= Mass in g of the material taken for the test

ANNEX C

(normative)

Determination of crude fibre

C.1 Reagents

C.1.1 Petroleum ether:

C.1.2 Dilute sulphuric acid*:* 1.25 % (m/v) accurately prepared.

C.1.3 Sodium hydroxide solution*:* 1.25 % (m/v) accurately prepared.

C*.1.4 Ethanol:*** 95 % (v/v)

C.2 Procedure:

Weigh accurately about 2.5 g of the ground material into a thimble and extract for about 1 hour with petroleum ether using a Soxhlet apparatus. Transfer the material in the thimble to a one-litre flask. Take 200 ml of the dilute sulphuric acid in a beaker and bring to boil. Transfer the whole of the boiling acid to the flask containing the fat-free material and immediately connect the flask with a water-cooled reflux condenser and heat so that the contents of the flask begin to boil within 1 minute. Rotate the flask frequently taking care to keep the material from remaining on the sides of the flask and out of contact with the acid. Continue boiling for exactly 30 minutes. Remove the flask and filter through fine linen (about 18 thread to the centimetre) or through a coarse acid washed hardened filter paper, held in a funnel and wash with boiling water until the washings are no longer acidic to litmus paper. Bring some quantity of sodium hydroxide solution to boil under reflux condenser. Wash the residues on the filter into the flask with 200 ml of boiling sodium hydroxide solution. Immediately connect the flask with the reflux condenser and boil for exactly 30 minutes. Remove the flask and immediately filter through the linen or the filter paper.

Thoroughly wash the residue with boiling water and transfer to a Gooch crucible prepared with a thin but compact layer of ignite asbestos. Wash the residue thoroughly first with hot water and then with about 15 ml of ethyl alcohol and with three successive washings of 15 ml of petroleum ether each. Dry the Gooch crucible and contents at 105 ± 1^{o} C in an air-oven for 3 hours, cool and weigh. Repeat the process of drying for 30 minutes, cooling and weighing until the difference between two consecutive weighings is less than 1 mg. Incinerate the contents of the Gooch crucible in the muffle furnace at 550 ± 20 ^{o}C until all the carbonaceous matter is burnt. Cool the Gooch crucible containing the ash in a desiccator arid weigh.

C.3 Calculation

Crude fibre (on dry basis), percent by mass

$$= \frac{100\,(M_1 - M_2)}{M} * \frac{100}{(100-H)}$$

Where: M_1 = mass in g of Gooch crucible and contents before ashing.

M_2 = mass in g of Gooch crucible containing asbestos and ash,

M = mass in g of the material taken for the test

H= moisture content of the sample as received in percent